

AMERICAN ARTISAN

RESIDENTIAL AIR CONDITIONING
WARM AIR HEATING • SHEET METAL CONTRACTING



MAY
1939

ESTABLISHED

8 8 0

LAMNECK SERIES 700 SYSTEM PREFABRICATED DUCT AND FITTINGS

**A NEW TYPE
CONNECTION**
FOR DUCT AND STACK—

*An Advanced Idea
Unparalleled
in the Industry*



**Simplifies and Speeds Up
Duct and Stack Assembly
... Reduces Air Resistance**

● The amazing ease and speed with which Series 700 System is assembled is due in large measure to a marvelous new type Duct and Stack Connection originated by Lamneck.

This exclusive new Lamneck feature is a separate unit into which the unformed ends of the Duct and Stack can be slipped easily without the aid of tools. The Connection is made with a *positive automatic lock* which holds the Duct and Stack securely in place. Notching of Duct, Stack or Fittings is eliminated, thus providing a tight, rigid joint, free from leakage or rattles. The need of large or

small ends of duct at the joint is also avoided.

The new Lamneck Connection provides a more substantial assembly which sets a new low in installation cost. At the same time it insures a more efficient and better looking job. Finally, it leaves the inside of the Duct perfectly smooth, offering little or no resistance to the flow of air in either direction. This feature is of greatest importance in efficient air distribution.

Lamneck Series 700 System has everything it takes to make installation speedy, efficient and economical.



Write for Name of Your Nearest Distributor.

LAMNECK PRODUCTS, INC.

414 DUBLIN AVENUE

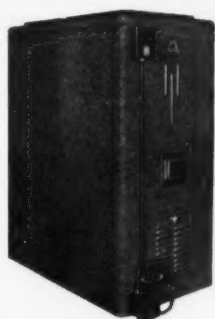
COLUMBUS, OHIO

**PREFABRICATED DUCT AND FITTINGS FOR ALL TYPES OF RESIDENTIAL
WARM AIR HEATING AND AIR CONDITIONING SYSTEMS**

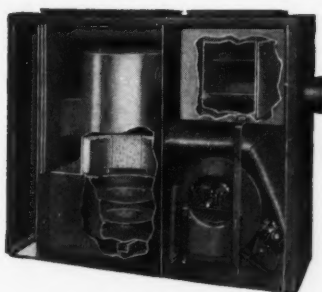


STEP OUT WITH Lochinvar
and YOU STEP UP YOUR SALES

THE LINEUP OF THE BIGGEST FURNACE VALUES ON THE MARKET

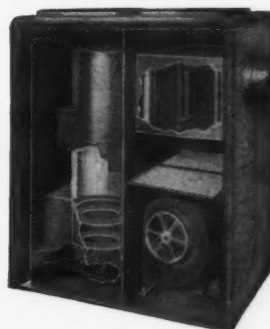


Challengeaire, Lochinvar's new Package-Unit for the lowest price homes. A fully automatic, oil-burning winter air-conditioning unit that's shipped completely assembled with blower, motor and all controls mounted and wired. Is 24" wide, 43" high, 54" long (can pass through any door)



The Model 100A is a complete winter air-conditioning unit with 110,000 B.T.U. output at register with a 1,700 c.f.m. capacity.

Dimensions—32" wide, 57" high, 69 $\frac{3}{8}$ " deep.



The Junior-Aire is a complete winter air-conditioning unit with a B.T.U. capacity at the register of 85,000 and c.f.m. capacity of 1,000.

Dimensions—32" wide, 53" long, 54" high.



The Model 100 is a gravity warm air furnace, ideal for replacement, for its price complete is about the same as an ordinary oil burner alone.

Dimensions—36" wide, 41" deep, 64" high.

● Lochinvar furnaces are one of the largest selling line of furnaces on the market today. The reason for this sales leadership is not only through their low prices but because each unit is constructed to give dependable and economical performance at all times.

HERE'S A SPRING TONIC FOR YOU . . . LOCHINVAR'S WATER HEATERS

MODERN IN DESIGN

20, 30, 40, 50 gallon SIZES

Multiple-Stage **BURNER**



PRICES ARE THE LOWEST

COMPLETELY AUTOMATIC

ECONOMICAL TO OPERATE

● Lochinvar's automatic oil burning water units are now available in the 20, 30, 40, and 50 gallon sizes, they are attractively designed, and their economical and trouble free performance makes them a popular unit among the builders and home owners. You'll find

that these water heaters are truly a "spring tonic" to your slump in sales during the "off" season for furnaces. Why not let us tell you more about the complete Lochinvar line, by writing for literature and prices today?

LOCHINVAR CORPORATION

**14247 FIREMAN
DEARBORN, MICH.**

AMERICAN ARTISAN

WITH WHICH ARE MERGED

FURNACES
SHEET METALS

AND

Warm-Air
Heating

Covering All Activities in Residential Air Conditioning and Small Commercial Cooling, Warm Air Heating, Sheet Metal Contracting and Fabricating

J. D. Wilder, Editor

A. A. Kennedy, Assistant Editor

Vol. 108, No. 5

May, 1939

Founded 1880

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In This Issue

NEWS out of Washington is that Title 1 and Title 2 of FHA will be extended with some revisions which, so far as we can see, effect our industry not the slightest. For latest reports see page 36.

In April we published an article on the Gasco Guide (gas heating regulations). Considerable interest was evidenced so in this issue and in June we will publish the full text of the code. (Page 41). Anyone wishing a printed copy, write the editors.

Last month, S. Konzo began a series of articles covering facts on cooling as developed in the Research Residence. On page 42, he continues the discussion of the factors which increase or decrease the cooling load. Some mighty valuable data in this article.

With stainless steel so widespread in application, the problems of cutting, forming, shearing, welding, grinding, polishing and protection are of infinite value. On page 59 is part 3 of a series on this subject. A limited number of tear sheets of articles 1 and 2 are available.

Domes have fascinated the sheet metal contractor since sheet metal work began, just as bridges fascinate the structural engineer. On page 62 we describe a planetarium dome with the contractor's complete description of how the metal was templated, formed and applied.

An interesting ventilation installation is pictured and discussed on page 68. In this installation getting the ducts fitted and in place was possible only by careful planning. How the installation was handled, makes the story.

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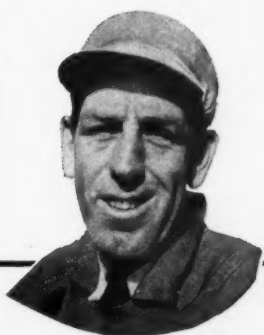
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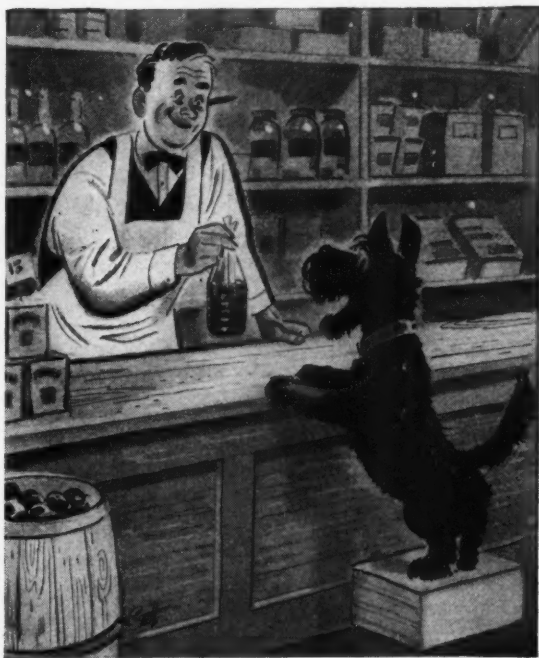
A Canny Dog has Sandy!

BY TIM SHEARS



It's close to quitting time one night an' the boys are swapping yarns about dogs. Says Sandy McPherson, "Did ah ever tell ye about my dog Jock?"

"Well," he goes on, "once in a while I gie him a penny, an' off he trots to the grocer's to get himsel' a cookie. I'm in there mesel' one day, an' the grocer asks me don't I gie Jock the pennies



any more? 'Sure,' says I. 'Well,' says he, 'I've seen neither hide nor hair of 'im this whole past week!'"

"A few days later ah'm in the store again. 'Hae ye seen Jock, yet?', says I to the grocer? 'Have I seen him,' he laughs, 'He was in here only this morning! An' what a wise one. He'd saved up five of the pennies you give him...so he could get six cookies for a nickel!'"

The boss hears this yarn, an' asks me do I remember the Yankee dye-house foreman whose dog used to jump into the Monel-lined vat to take his bath? "It's quite a while since you were up in that neck of the woods," he adds. "Better run up there tomorrow. I hear they're putting in an-

other new tank." This outfit already has bleaching tanks an' such, all made of Monel, so I'm sure as a lock-seamed joint they'll use it for the new one, too. The foreman an' super both know they put an end to grief when they put in Monel.

By the time I drift in, the local contractor has the new tank all made. Smooth, flat sides; corners lock-seamed; and silver-soldered inside, soft-soldered outside.

"A mighty sweet-looking job!", I tells the

contractor. "An' why not?", he comes back, "It's a cinch to work Monel. What's more," he confides, "there's money in Monel, and plenty of calls for it...especially around a dyehouse. Just take a look!"

At that I squints around. What a picture for any sheet metal man! Monel transfer trucks...and bins, troughs, batch cans, utensils, an' what have you...all made of Monel. "Don't think that guy sold us this stuff," says the dyehouse foreman, pointing to the contractor. "We ordered it ourselves. Nothin' like it for dyehouse equipment. Never rusts or corrodes. An' even when Monel equipment gets old, it still works like new!"

* * *

There's a load of dough in making dyehouse equipment. An' any sheet metal man that knows how to handle Monel can get the orders. So here's a tip for you guys who're out for the business:

We have a swell booklet on how to build dye tanks an' suchlike. "Practical Considerations in Dye Tank Construction" is the curse the office put on it. But you don't need to spell out all that. Just write in an' ask for Tim Shears' "Dope on Building Dye Tanks."

Yours for Easy Pickings and Big Pay,

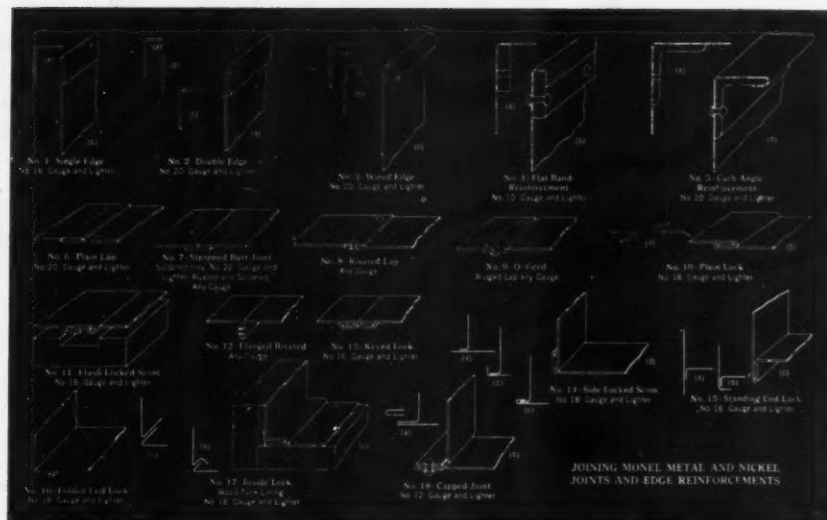
TIM SHEARS

THE INTERNATIONAL NICKEL
COMPANY, INC.

67 Wall Street

New York, N.Y.

"Monel" is a registered trade-mark of The International Nickel Company, Inc., which is applied to a nickel alloy containing approximately two-thirds nickel and one-third copper.

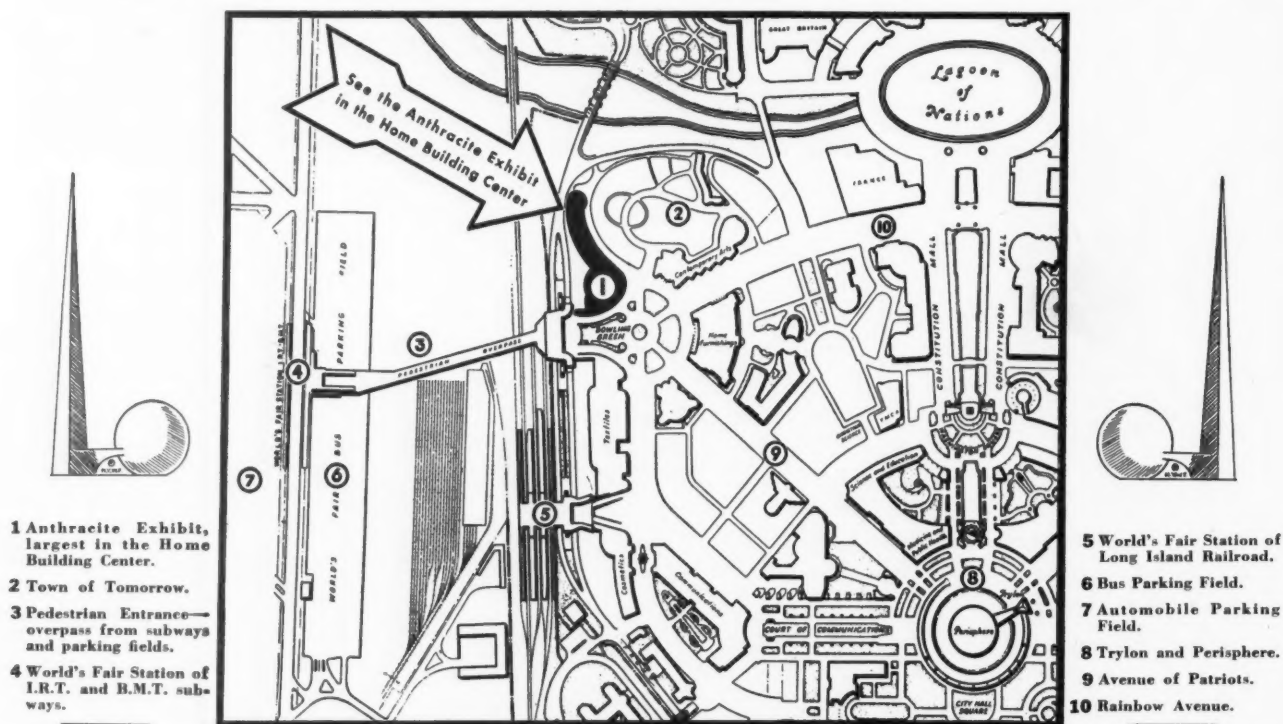


One of the many illustrations in Tim Shears' book on "Building Dye Tanks." Send for your copy, free.

ANTHRACITE

WORLD'S FAIR EXHIBIT

where it is and how to reach it



WHEN you visit the World's Fair, plan to see the Anthracite Exhibit first. Whether you go to the Fair by train or subway, by World's Fair bus or private car, you will find the Anthracite Exhibit, in the Home Building Center, close at hand. The diagram above shows how near this Anthracite Exhibit is to the entrances that will be most used.

See this most unique Anthracite Exhibit—created by Gilbert Rohde, one of America's foremost industrial designers. See the glowing cube of "Anthracite," held in a giant feminine hand that dwarfs people standing

beside it. See the sixty-foot wall of "Anthracite" that changes from jet black to a red glow. See the "picturama" of the Anthracite producing region and its many products other than Anthracite. See the three-dimensional action display of automatic Anthracite equipment—and the White Room that contains a talking Anthracite heater.

One of the most interesting and outstanding Exhibits in the World's Fair will be the Anthracite Exhibit. See it first when you visit the Fair. Anthracite Industries, Inc., Chrysler Building, New York, N. Y.

GILBERT ROHDE

who created the unique Anthracite Exhibit, is one of the 5 industrial designers appointed by the World's Fair Corporation to design its own exhibits and buildings.



Save with
Pennsylvania **ANTHRACITE**
(HARD COAL)
THE ONLY 7 STAR FUEL

A Genuine WEIR In The Price Field!

The new "P" series WEIR is exactly that . . . with the fundamental "family characteristics" clearly showing from top to bottom and from front to back! It further completes the WEIR line "for Coal, Oil or Gas."

Economy, long life and lasting satisfaction are plainly BUILT INTO this new WEIR . . . and as a WEIR dealer you can "out-point" other "price" furnaces in selling it . . .

And you'll have an Exclusive Weir Franchise that Really is Exclusive!

This 72-year-old Company still has its two original foundation stones: (1) The best product we know how to build and (2) a Dealer Policy so fair that 25-year-old Dealerships are common.

WEIR "P" FEATURES

Heavy cast-iron front, individually mounted—easily erected.

All welded seams are re-inforced with rivets. No bolts. Large fire and ash doors with adjustable hinges to assure tight fit.

Large capacity humidifier at top where evaporation is fastest. Extra-heat radiator of hot-rolled annealed steel with outlet collar extending through casing to prevent gas leakage. 18-inch-high fire-pot, refractory lined.

Duplex grates with improved shaking device. Galvanized round or furniture-steel square casing—the slickest and quickest on the market.

Blower-filter unit with automatic controls specially designed for "P" square casing.



THE MEYER FURNACE COMPANY

PEORIA, ILLINOIS
ESTABLISHED 1866

Manufacturers of

WEIR AND MEYER STEEL FURNACES AND
DOMESTIC AIR CONDITIONING APPLIANCES

"WHO MAKES IT MAKES A DIFFERENCE"



(Sign or clip to your letterhead)
The Meyer Furnace Company, Peoria, Ill.
Please send full details about
a Weir dealership.

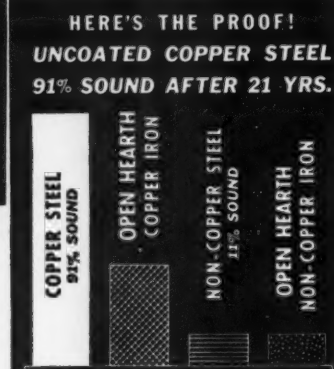
HERE'S YOUR ASSURANCE OF DUCTS

THAT ARE *Easy to Build...*

Easy to Sell!



NOTICE THE 180° BENDS, the neat turns, the complicated door for this piece of duct work. The easy workability of U·S·S Galvanized Copper Steel cuts fabricating time on jobs like this. The extra protection this metal offers against rust adds materially to its life.

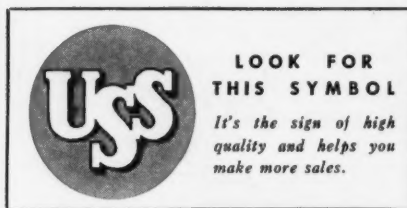


This chart compiled from inspection reports of the Committee on Corrosion of Iron and Steel, A.S.T.M. Proceedings 1937, shows results of tests carried on at Annapolis, Md. from 1916 to 1936. After 21 years' exposure, 91% of COPPER STEEL sheets remained "sound" (unperforated). Other materials were decidedly inferior.

YOUR customers want long-lasting metal work—and you want a steel that's easy to work. U·S·S Galvanized Copper Steel satisfies both requirements. Cut it. Bend it. Rivet it. You'll find it fabricates readily into complicated shapes; helps secure neat joints, true bends, tight seams; saves valuable time on any job.

And for your clients, the use of U·S·S Copper Steel for ducts, housings, furnaces, results in definite savings over a period of years. The extra protection against rust that this material offers assures fewer replacements, longer-lasting installations, lower maintenance costs and consequently, satisfied customers. It's easy to sell a heating system built of U·S·S Galvanized Copper Steel because of its many advantages.

Ask your supplier about U·S·S Copper Steel, galvanized or terne plate. It is rapidly becoming the preferred metal for air-conditioning systems, roofing, gutters, downspouts, flashings. Write today for complete information.



U·S·S GALVANIZED COPPER STEEL SHEETS

CARNEGIE-ILLINOIS STEEL CORPORATION, Pittsburgh and Chicago

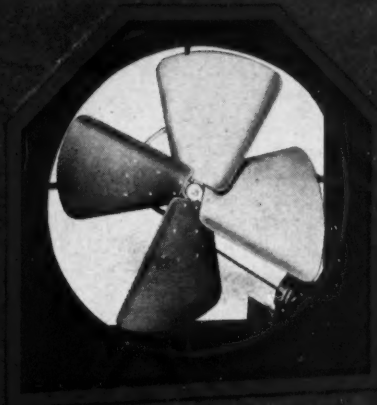
COLUMBIA STEEL COMPANY, San Francisco

TENNESSEE COAL, IRON & RAILROAD COMPANY, Birmingham

Scully Steel Products Company, Chicago, Warehouse Distributors • United States Steel Products Company, New York, Export Distributors

UNITED STATES STEEL

How to Make Money out of Summer Ventilation



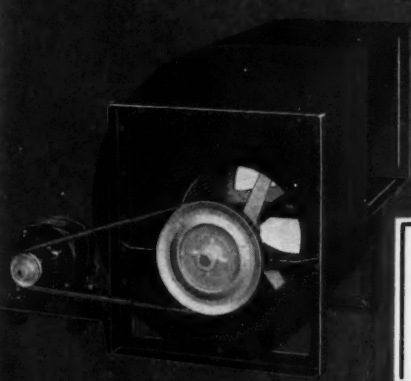
HY-DUTY Attic Ventilators

Propeller type, with wide blade fan. High air delivery at slow speed. Quiet operation, low current consumption. Four sizes ranging from 7,000 CFM to 20,500 CFM.

● The public wants the comfort of summer ventilation in their homes, their places of business and in the public places they patronize. Summer ventilation means profit to business establishments and ideal comfort in homes.

Making money out of this rapidly growing demand depends very largely on the ventilators you install—their suitability for the job, their air delivery, their quietness, their economical operation. The quality of your fan is your best selling argument, your best insurance of customer satisfaction.

Schwitzer-Cummins HY-DUTY Ventilators cover practically every requirement that arises in this new, popular field. No better fans are built. They are manufactured in our plants in Indianapolis which are fully equipped to produce fine fans in large quantities. Our volume production costs permit us to price ventilators so as to provide attractive earnings to our dealers.



HY-DUTY Blowers

There is a Hy-Duty blower for every purpose. Capacities 400 CFM to 15,000 CFM. Four different outlet positions.

Exclusive privileges
are now being offered in some territories. Send for complete information.

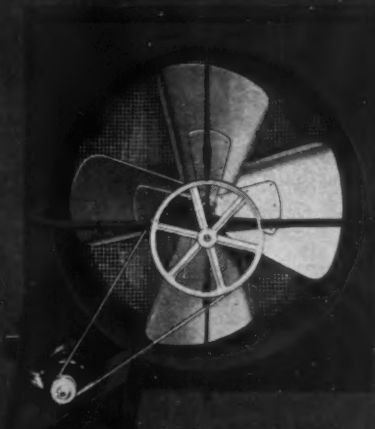
Write Us!

HY-DUTY Home Ventilators

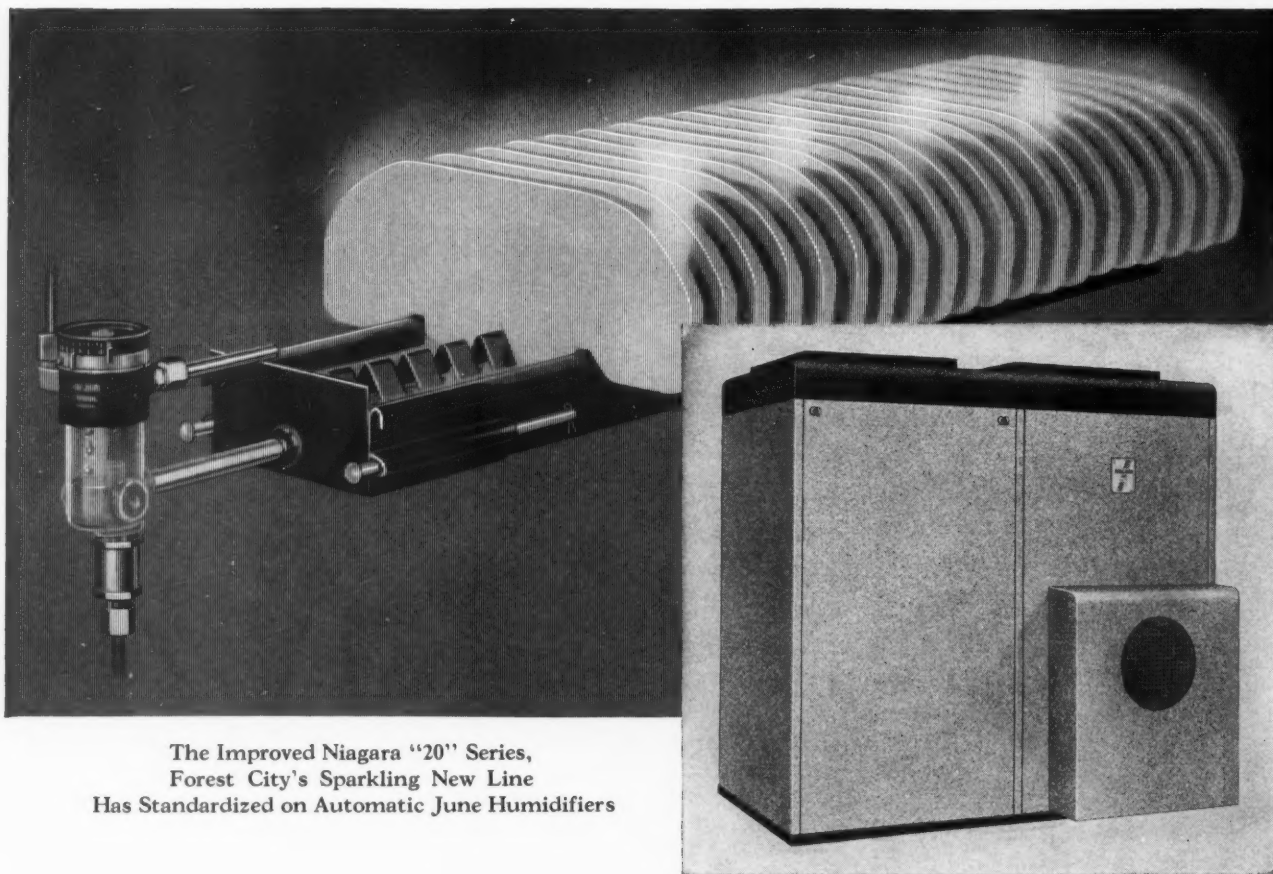
Multi-blade blower fan type for positive handling of air against unusual restrictions, complicated room arrangements, etc. Fifteen models.

HY-DUTY General Ventilators

Propeller fan type for use in kitchens, garages, factories, auditoriums, etc. Adaptable to attic ventilation.



MANUFACTURED BY THE BLOWER DIVISION OF
SCHWITZER-CUMMINS COMPANY
LOCATED AT FAN STREET . . . INDIANAPOLIS, U.S.A.



The Improved Niagara "20" Series,
Forest City's Sparkling New Line
Has Standardized on Automatic June Humidifiers

You Can Make MORE MONEY SELLING CONDITIONERS EQUIPPED WITH "AUTOMATIC JUNE"

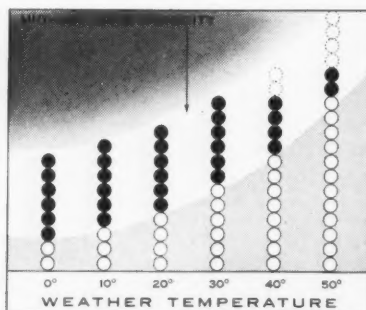
It is becoming increasingly difficult to sell winter air conditioners that cannot demonstrate in advance that they produce perfect humidification—never too little moisture and never too much.

To the best of our knowledge, Automatic June is the only humidifier available commercially that can demonstrate this ability. Its patented plates, plate holder and controls combine to give scientific humidification that is automatically weather-graduated.

That is why most prominent lines offer Automatic June as standard or optional equipment. We are delighted to welcome Forest City Foundries

Company to the standard equipment group. The remarkable sales record of their improved Niagara "20" series is a far more eloquent testimonial than any we could give.

If you are now selling a line that offers Automatic June, you know its merchandising power. If you are not we suggest that you investigate. We will be glad to send you a complete list of the lines offering Automatic June perfect humidification.



MONMOUTH PRODUCTS CO.
General Offices and Factory
1933 E. 61st St.
CLEVELAND, OHIO

AUTOMATIC JUNE
GRADUATED HUMIDITY CONTROL

READ WHY CONCO RANKS IN STOKERDOM'S BIG THREE

CONCO STOKERS

HAVE WHAT IT

Takes!

SIZES!

DOMESTIC AND HEAVY DUTY

There's a Conco Stoker for every firing need . . . six hopper type domestic models . . . four bin feed models (and the most advanced type bin feed on the market!) . . . and six heavy duty models ranging up to 750 pounds per hour capacity. A real line-up of stokers.

PRICED

Whether you are selling our smallest domestic model or one of our large heavy duty models, you can be sure your price is competitive if you are the CONCO STOKER dealer. You'll never find doors closed because of price. And our models **SELL LOWER** than MANY of the stokers you'll be selling against!



MAGIC HAND . . .

Conco Stoker dealers can talk Magic Hand the controls that do everything but talk!

TRANSMISSION . . .

Conco uses a precision-made transmission; the best of materials. Proven by hard use on thousands of installations. Up to five fuel feed speeds. Automatic air.

MAGIC TELL-TALE

Here's something no other Stoker has! . . . an automatic light signal that tells when the stoker needs service attention. Let us tell you more about it.



SALES HELPS GALORE!

Catalogs showing all models
Envelope Stuffers
Direct Mail Series

Neon Signs
Decalcomania Transfers
Window Posters
Window Streamers
Exhibit Displays
Giant Blowups
Window Bulletins

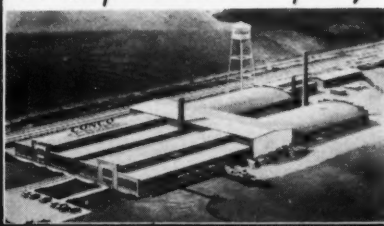
Stoker Game
Newspaper Ads
Newspaper Mats
Prospect Cards
Prize Contest
Sales Manual
Ideas for Salesmen

Stoker Pattern
Sales Demonstrator
Economy Check Lists
Commercial Stoker letter series
Handbills
Construction Facts

Conco Stokers

ARE MANUFACTURED BY

A Responsible Company



A record of 22 years of business integrity and experience in the construction of machinery and equipment is behind the Conco Stoker. Our Corporation is a Division of H. D. Conkey & Company. We invite your reference to Dun and Bradstreet as to our financial stability.

Easy to Install

PRACTICALLY NO SERVICE PROBLEMS

Clip and Mail!

COUPON REQUEST FOR FULL INFORMATION

Conco-Sampsel — Please send us full information concerning the Conco Stoker franchise, and have your representative call on us. We handle make of stokers at present.

Name of individual

Firm name

Address

City State

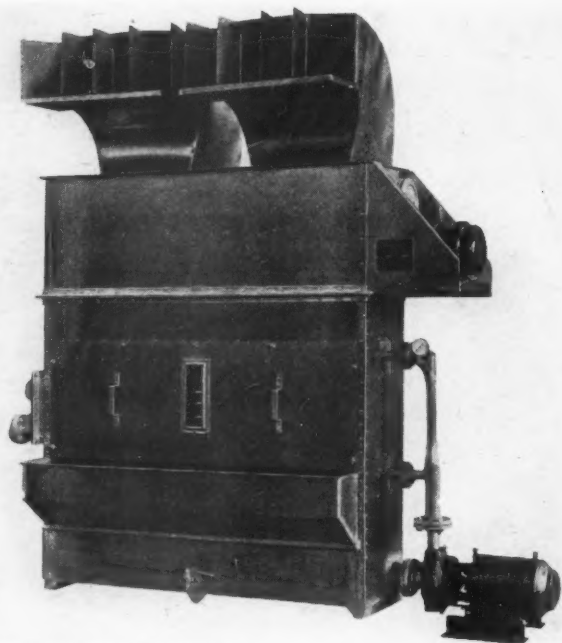
CONCO-SAMPEL STOKER CORPORATION

MENDOTA • ILLINOIS

CONCO'S THE FULL . . .

PROFIT LINE IN "THIRTY-NINE"

WHILE NIAGARA AIR-CONDITIONERS COOL, FREEZE AND HUMIDIFY SHAFTS TURN FREELY



BUILT BY NIAGARA BLOWER CO.

SKF Bearings are responsible for the elimination of noise and bearing trouble on this Series 300 Air-Conditioner. In place of noise and time-wasting, money-wasting breakdowns, shafts turn freely as this machine cools, humidifies and freezes eggs, meats, vegetables, beverages, etc.

SKF Bearings have the self-alignment, high capacity and stamina to do a dependable job for a surprisingly long time. They run *quietly* inside a compact, easy-to-assemble SKF Pillow Block. 4324

SKF INDUSTRIES, INC., PHILADELPHIA, PA.

THE BEARINGS ARE SKF

BALL & ROLLER
BEARINGS



ARE YOU GETTING YOUR SHARE OF

"Gravity" Business?



Don't Overlook the Possibilities of this Great Market...

When you stop and think that the big majority of warm air jobs installed are still for gravity circulation, you will realize the importance of handling an honest-to-goodness line to present to your customers. Mt. Vernon "Vernois" Furnaces give you every assurance of operating perfection plus long-lasting qualities... They are built of Vernalloy... the toughest cast iron made... the metal that is famous for its "Hell on Earth" test, and the astounding results it produced. Vernois Furnaces also combine many exclusive features that assure easy operation and utmost fuel economy... In other words they have what it takes to create sales for a fine Gravity Furnace... will meet competition and still come out on top.



Line up with **MT. VERNON** *now!*

Assure yourself of being able to bid on every type of warm air installation. . . Don't limit yourself to forced air and air conditioning unit sales only. . . Bolster your line and increase your sales and profits with this great gravity line that possesses the features that appeal to prospects and converts them into customers. . . Handle the Mt. Vernon Vernois Line of fine furnaces that are priced right for profitable selling.

**SEND FOR
COMPLETE NEW
DISTRIBUTION PLAN
AT ONCE**

Vernois FURNACES

MT. VERNON FURNACE & MFG. CO.

MT. VERNON

ILLINOIS

INDEPENDENT

"Fabrikated"

Leads in Performance



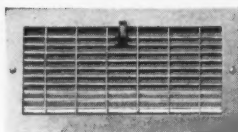
• "Fabrikated" construction—originated by Independent—has made it possible to direct air flows from registers and grilles. Directional air flows which could not otherwise be effected are accurately and easily attained with "Fabrikated" Adjustable Directed Air Flow Registers and Grilles—up or down or sidewise, or four-way direction. Adjustments can be made after the register or grille is in position to meet unforeseen or changing conditions. Grille bars do not require locking. They remain firmly in place, tamper-proof, and will not vibrate nor rattle.

Send for catalog and data book

THE INDEPENDENT REGISTER COMPANY
3747 EAST 93rd STREET CLEVELAND, OHIO

539

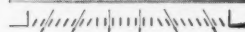
ALWAYS LEADING . . . ALWAYS PROGRESSING



• Each grille bar can be adjusted individually with two-pronged tool which accompanies each shipment. Thus



air flows can be directed in various directions from the same register or grille.



INDEPENDENT "Fabrikated" (REG. U. S. PAT. OFF.)

FLOOR REGISTERS AND COLD AIR FACES
AND AIR CONDITIONING REGISTERS AND GRILLES

BUILD UP YOUR BUSINESS



A NAME THAT BUILDS CONFIDENCE A LINE THAT TAPS ALL MARKETS

- 1 RESIDENTIAL WINTER AIR CONDITIONING
- 2 RESIDENTIAL BOILER-BURNER UNITS
- 3 RESIDENTIAL GRAVITY FURNACES
- 4 RESIDENTIAL CONVERSION EQUIPMENT
- 5 PACKAGED RESIDENTIAL AND COMMERCIAL COOLING

FOR
COAL, OIL
OR GAS

NEVER BEFORE

HAS SUCH A VALUABLE FRANCHISE
BEEN OFFERED TO THE HEATING TRADE

Think of it, a really complete line of Heating and Air Conditioning . . . for old and new homes, for large and small homes, for burning oil, coal or gas. And besides, Westinghouse puts you in the commercial cooling business with a line of "packaged" Unitaires, *that are as easy to install as forced-air furnaces.*

Something to sell to every one in every season —
ALL UNDER ONE FAMOUS SALES AND PROFIT-BUILDING NAME.

Liberal promotion and sales programs are immediately available to help you aggressively go after your complete LOCAL market.

Your territory may still be open . . . so act quickly . . . use the coupon below or wire.



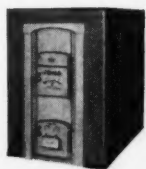
OIL-FIRED
AIR CONDITIONER



GAS-FIRED
AIR CONDITIONER



STOKER-FIRED
AIR CONDITIONER



HAND-COAL-FIRED
AIR CONDITIONER
(Heavy-Duty)



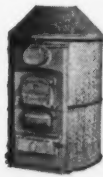
HAND-COAL-FIRED
AIR CONDITIONER
(Standard)



RESIDENTIAL
COOLING UNITS



GAS-FIRED GRAV-
ITY FURNACES



CAST-IRON GRAV-
ITY FURNACES



STEEL GRAVITY
FURNACES
(Heavy-Duty & Standard)



OBE and OB
OIL-FIRED BOILERS



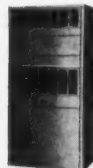
BLOWER-
FILTER UNITS



CONVERSION
OIL BURNERS



CEILING TYPE
UNITAIRE
(One-Ton Capacity)



STORE TYPE UNITAIRE
(3 sizes, 2½, 3¾ and
5½-Ton Capacity)



CENTRAL-PLANT
UNITAIRE
(10 & 15-Ton Capacity)

Westinghouse

RESIDENTIAL . . . COMMERCIAL
HEATING AND AIR CONDITIONING

WESTINGHOUSE ELEC. & MFG. CO.
Dept. 9084, Mansfield, Ohio
Please send "Full Line" information
at once.

Name.....

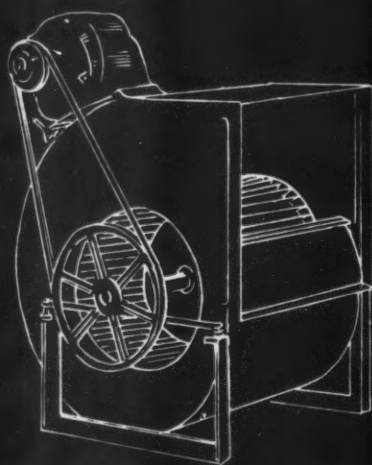
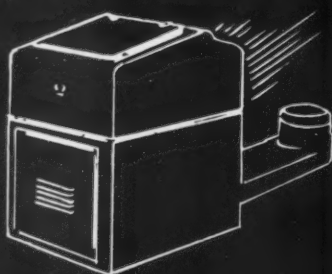
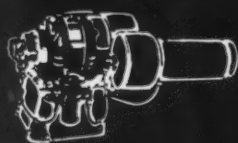
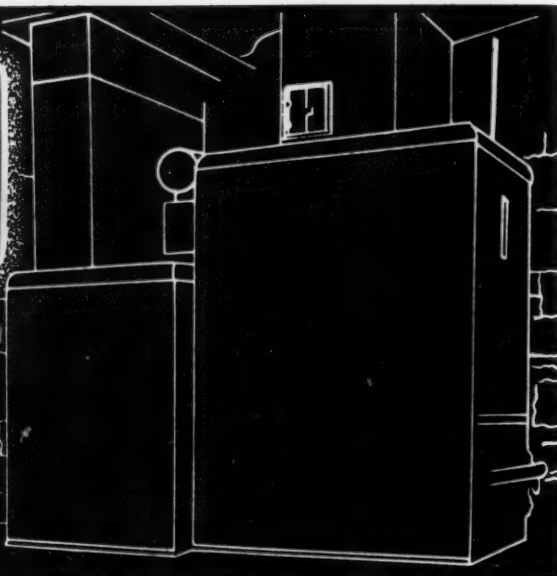
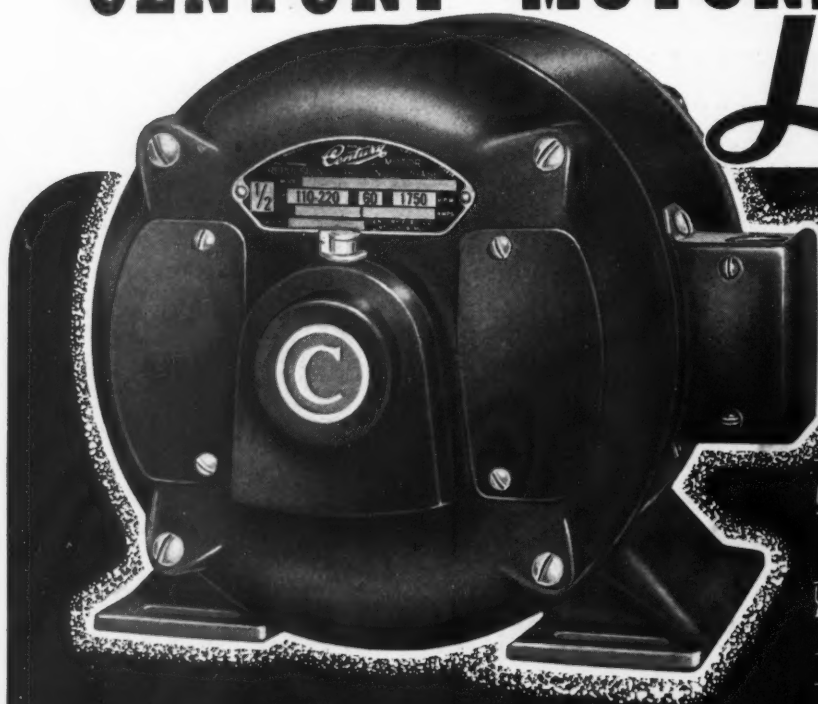
Firm.....

Address.....

City.....State.....

ON THIS SOLID FOUNDATION

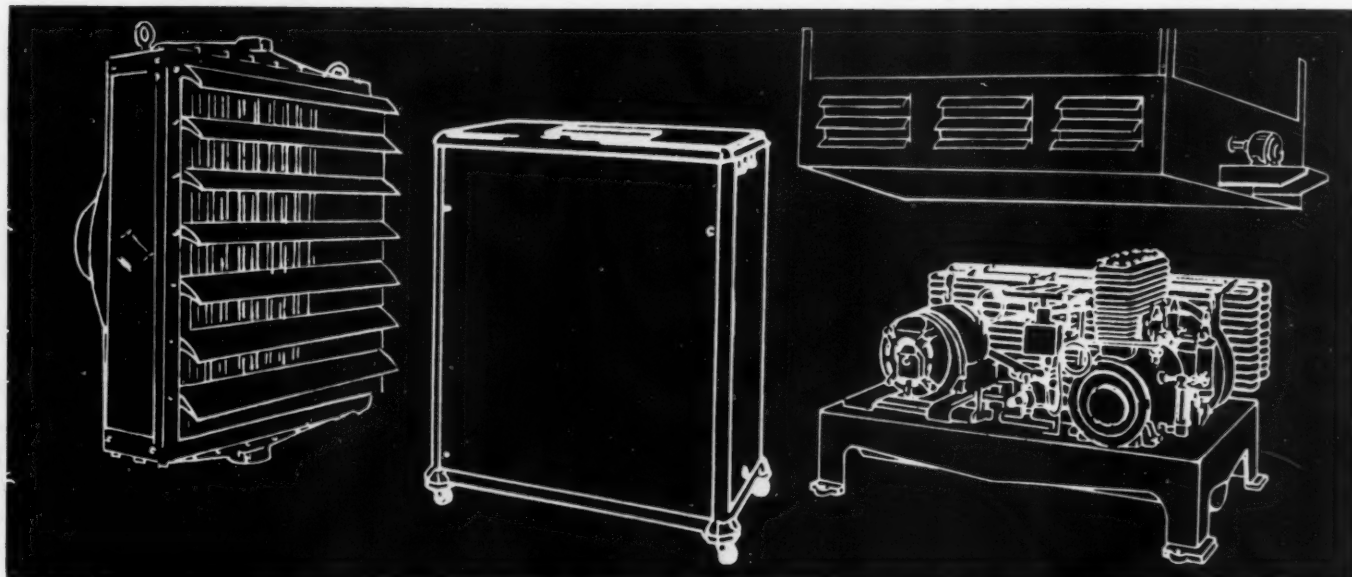
CENTURY MOTORS *Leaders*



JUST A FEW *Century* MOTOR FEATURES

- ★ **STARTS WITH AMAZING QUIETNESS . . .** Groans and grunts from starting can be more disturbing than noise from running.
- ★ **RUN QUIETLY . . .** Air conditioning comfort—Must be quiet comfort.
- ★ **HARD TO START LOADS . . .** Ability to start and bring the modern compressor loads up to speed, without overmotoring the running load. Also, you can use the same size polyphase motor as single phase.
- ★ **THERMAL OVERLOAD BUILT-IN PROTECTION . . .** Very low cost protection. Most fractional sizes available. Listed by Underwriters. Protects two ways—over-current—over temperature. Test this protection yourself, lock the rotor and be convinced.
- ★ **ADDED PROTECTION IN DAMP BASEMENTS . . .** Everybody is talking about Century's new insulation which resists moisture and gives added safety insurance.
- ★ **LONG LIFE CONSTRUCTION . . .** Ask about the large cast phosphor bronze bearings, with greater resistance to trouble from amateur belt adjustments. The unique bearing bumpers that reduce chatter from V-belt vibration. Century wool yarn oiling system (fractional sizes) that lubricates for at least a year without attention.
- ★ **LOW STARTING CURRENT . . .** Where starting current limitations is a problem, investigate Century type RS repulsion start induction motor for single phase and type AS automatic start for polyphase. Reduces light flicker and gives better results when the lines are heavily loaded.

... IN EVERY HEATING COOLING AIR CONDITIONING FIELD ...



THE PROBLEM

... are you using the correct motor?

Century Motors established their reputation in driving blowers and fans, pumps, refrigerator compressors, unit heaters and coolers, oil burners, stokers, etc., long before the combination of these units were referred to as Air Conditioning. The result of continued study of motor applications—of determination to anticipate the trend—hence they were ready for the development.

As a result, there is a type and size of Century motor to accurately match the application requirements of each part of the installation to meet the varying starting, accelerating, and operating conditions smoothly, quietly and efficiently.

Your interests are best served when you select the proper motor for each application. Each part of an installation is important and Century is one of the few who offer a wide selection of types and sizes that makes correct application possible.

Century engineers will gladly assist you in an effort to solve your problems if you will address our nearest district office.



CENTURY ELECTRIC COMPANY
1806 Pine Street St. Louis, Mo.

Offices and Stock Points in Principal Cities

Atlanta • Baltimore • Boston • Buffalo • Chicago • Charlotte • Cincinnati • Cleveland • Dallas
Denver • Davenport • Detroit • Houston • Indianapolis • Kalamazoo • Kansas City • Los
Angeles • Milwaukee • Minneapolis • New Orleans • New York • Omaha • Philadelphia
Pittsburgh • Rochester • Salt Lake City • San Francisco • Spokane • Seattle • Tulsa

ONE OF THE LARGEST EXCLUSIVE MOTOR MANUFACTURERS IN THE WORLD



**NEAT WORK
IS EASY!**



With Granite City *Soft-forming* GALVANIZED SHEETS

All galvanized sheet work can be done more easily and accurately with Granite City Soft-forming Galvanized Sheets. Bends will be truer, seams tighter and joints neater.

Perfect-appearing work is vital in building a reputation, but more important immediately is the fact that Soft-forming stock makes it possible to work faster with *more profit* on every job.

You can depend upon Granite City

Soft-forming Galvanized Sheets to be uniform in ductility, gauge and size. Other characteristics which make for better work are an even, generous, tight coating of spelter; bright, uniform spangles; and unusual resistance to corrosion (especially, of course, in the copper bearing grades).

Ask your jobber to furnish Granite City Soft-forming Stock on your next order.

GRANITE CITY

GRANITE CITY



STEEL COMPANY

ILLINOIS

1803 Boatmen's Bank Building, St. Louis • 8 So. Michigan Boulevard, Chicago • 1613 Pioneer Building, St. Paul • 4000 York Street, Denver
1104 R. A. Long Bldg., Kansas City • 1602 Mariner Tower, Milwaukee • 77 McCall Place, Memphis • 435 Fifth Avenue Bldg., Moline, Illinois

"I'm certainly glad to have this book."

OSBORN

Golden Star Brand
METALS & METAL PRODUCTS
The J. M. & L. A. OSBORN Co.

"Its 172 pages contain just the information and prices I want on practically everything a sheet metal man uses."

Would you, too, like a copy of the new Osborn Book No. 39? It will be sent to you promptly if you will just fill out and mail the coupon below.

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Prominent architect
confirms his initial opinion
of **FITZGIBBONS**
DIRECTAIRE

Fitzgibbons direct in summer cooling was finally agreed upon, with ample sufficient heat during the past winter, I am pleased to endorse your equipment as being practically trouble free and providing excellent comfort during the entire year.

This house has already been visited by thousands of life.

Very truly yours,
Wm. F. B. Koelle
Architect



DUCT WORK — Horace T. Potts Co. and Wm. F. Cameron Co.
EASY OIL BURNER — Judson C. Burns
OIL — The Petrol Corporation

Here is a basement game room de luxe, an important element in the "Philadelphians at Home" exhibition house. Notice the Fitzgibbons Directaire conditioner in the background, where it is quietly and economically providing summer cooling, winter warmth, and correct humidity through constantly filtered air circulated to all parts of the house.

The convincing reasons behind the selection of the Directaire for this important installation, are set forth in full in the Directaire bulletin. Write for your copy.

"PHILADELPHIANS AT HOME"

a veritable model of residence beauty, convenience, and home comfort, has been a focal point of attraction

in the center of Philadelphia for a full year. Mr. Wm. F. B. Koelle, well-known architect and moving spirit in the enterprise, after full consideration, selected the Fitzgibbons Directaire conditioner for the important job of year-'round air conditioned comfort in this exhibition home. After a year of service of this unit, Mr. Koelle writes us, as above.

We are indeed pleased to receive the commendation of an architect with the standing and experience of Mr. Koelle — and are proud of the Fitzgibbons Directaire which has earned this approbation.



Fitzgibbons Boiler Company, Inc.

Air Conditioning Division: 101 PARK AVENUE, NEW YORK
Works: OSWEGO, N. Y. Branches and Representatives in Principal Cities



Youngstown's Sheets match the skill in your men's hands.

Forming seams, rolling a radius, cutting to template -- more money can be made when the skill in a man's hand meets a partner in Youngstown's steel sheets.

Mere ductility is not enough. Hands skilled by years to a uniform blow and expecting a uniform reaction become slow-speed novice hands when they have to fight ordinary sheets. *Uniform ductility is vital.*

That's why Youngstown insists on such close tolerances in sheet making. The base metal is invariable and *uniformly* ductile. Every uniform blow gets a uniform result. Skill meets a willing partner and production goes up.

Insist on Youngstown sheets for your work. The men will earn a better rate and you'll make a profit on Time and Material.

THE YOUNGSTOWN SHEET AND TUBE COMPANY

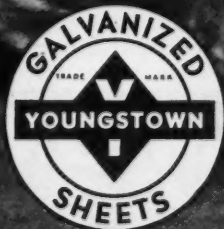
Manufacturers of Carbon and Alloy Steels

General Offices

YOUNGSTOWN, OHIO

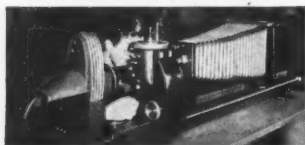
Sheets - Plates - Pipe and Tubular Products - Conduit - Tin Plate
Bars - Rods - Wire - Nails - Unions - Tie Plates and Spikes 10-6A

YOUNGSTOWN



"I'm sure glad the boss buys genuine PARKER-KALON screws

4 Reasons Why YOU CAN DEPEND ON PARKER-KALON PRODUCTS



Unexcelled Laboratory Facilities . . . The Parker-Kalon Laboratory which controls and maintains the high standard of quality for which Parker-Kalon Screws are so widely recognized, represents an investment of over \$250,000.



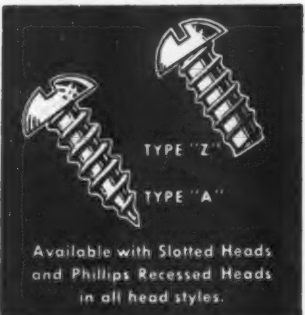
Specialized Production Equipment . . . (including the Parker-Kalon Hardening furnaces illustrated) is required to produce Parker-Kalon Self-tapping Screws and to maintain their uniformly high quality. The Parker-Kalon plant is famed as the most up-to-the-minute plant in the industry, with a capacity of 8,000,000 Screws per day.



Free Engineering Service . . . To assist designers and production men in obtaining better fastenings at lower cost, Parker-Kalon Assembly Engineers are available throughout the country. Their services are free to users of Parker-Kalon Self-tapping Screws as well as to those who wish to investigate the time-and-labor-saving possibilities of these Screws.

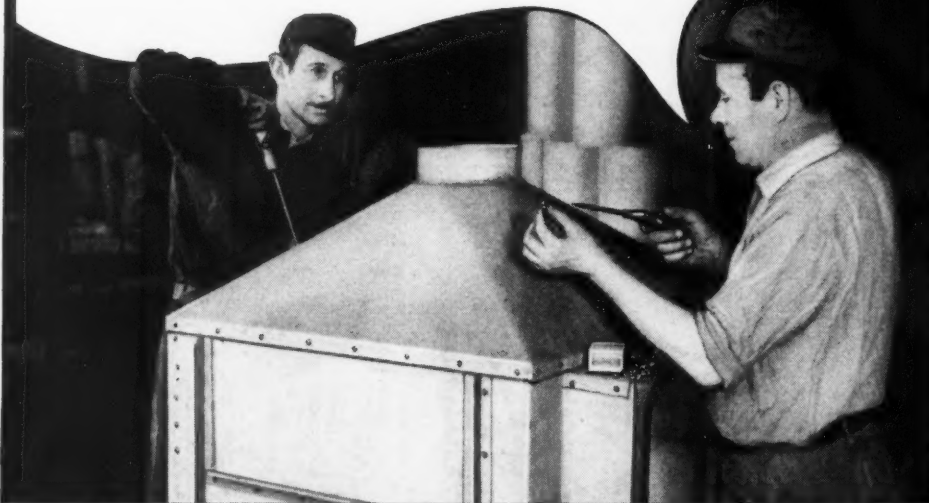


Available Everywhere . . . No matter where your plant is located there is a reputable supply house distributing Parker-Kalon Screws . . . assuring you of a dependable source of supply.



. . . there's nothing like 'em to
make the job easier and faster"

(Say thousands of mechanics who drive Sheet Metal Screws)



"TAKE it from a fellow who has used sheet metal screws for years . . . imitations always show up for what they are. I'm sold 100% on the genuine—Parker-Kalon. It's great to drive screws with threads that don't strip and heads that won't pop off. No squawks from the boss about poor fastenings, either. These Sheet Metal Screws certainly save a lot of time and make a swell job."

From contractors as well as the mechanics who actually use Sheet Metal Screws in thousands of sheet metal shops, such expressions are quite common, and testify to the benefits of buying only genuine Parker-Kalon Sheet Metal Screws. Parker-Kalon Quality is the result of over 25 years of specialized experience, unexcelled production processes and equipment . . . plus laboratory facilities without counterpart in the industry.

When buying Sheet Metal Screws, demand the genuine article . . . because imitations give imitation results. Parker-Kalon Corporation, 200 Varick Street, New York, N. Y.

Sold Only Through Recognized Distributors

PARKER-KALON Sheet Metal Screws



Prime Sheets and All Other Steel Products

● All Ryerson sheets (there are more than 25 different kinds) are of uniform high quality and assure excellent workability. They are all prime quality, carefully selected for finish, flatness, gauge and size accuracy. No seconds are ever carried.

Sheets are but one unit of the wide range of Ryerson Certified Steel products carried in stock for Immediate Shipment. There is hardly a

product in the finished steel and allied lines—bars, angles, channels, bands, tees, etc.—that you cannot secure at once from these large and complete stocks. Concentrate your steel requirements with one reliable source and save office work, time, trouble and money. If you do not have the current Ryerson Stock list, we will gladly send it.

RYERSON

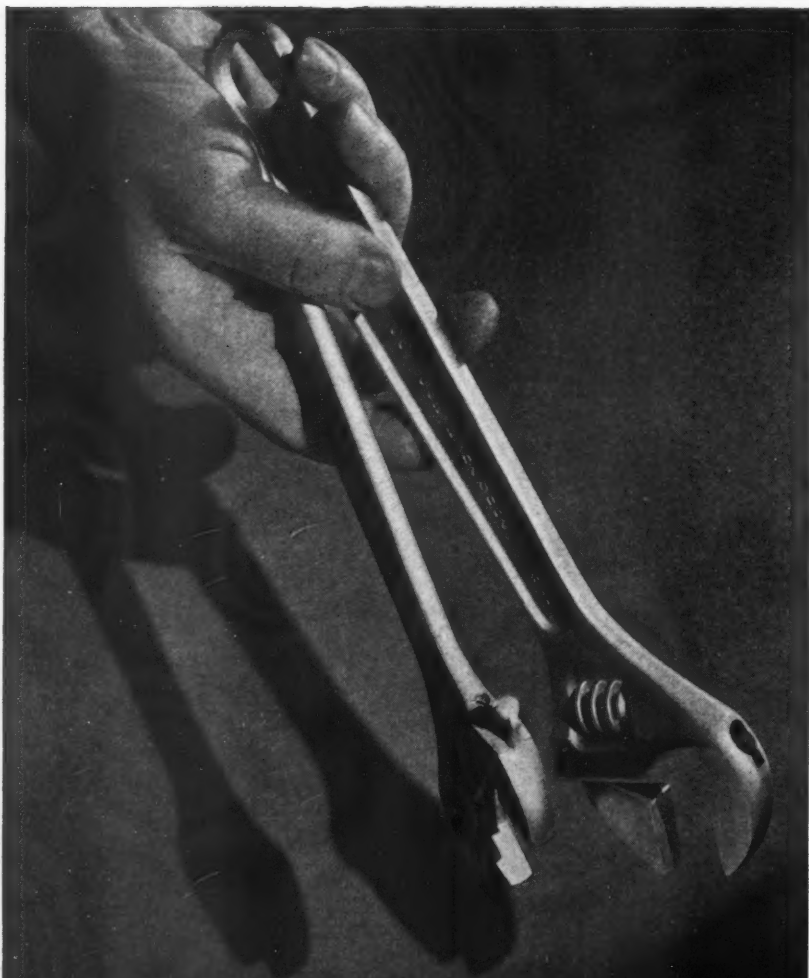
Certified

STEELS

JOSEPH T. RYERSON & SON, Inc. Plants at:
 Chicago, Milwaukee, St. Louis, Cincinnati, Detroit,
 Cleveland, Buffalo, Boston, Philadelphia, Jersey City

RYERSON SHEETS
INCLUDE:

Allegheny Stainless	Galvanized	Stretcher Levelled
Blue Annealed	Panel and Sign	Uniform Blue
Copper Alloy	Galvannealed	Vitreous Enameling
Corrugated	Heavy Hot Rolled	Wellsville Polished
Deep Drawing	Long Terme	and Many Others



Modern WRENCHES

THAT MAKE

Better MECHANICS

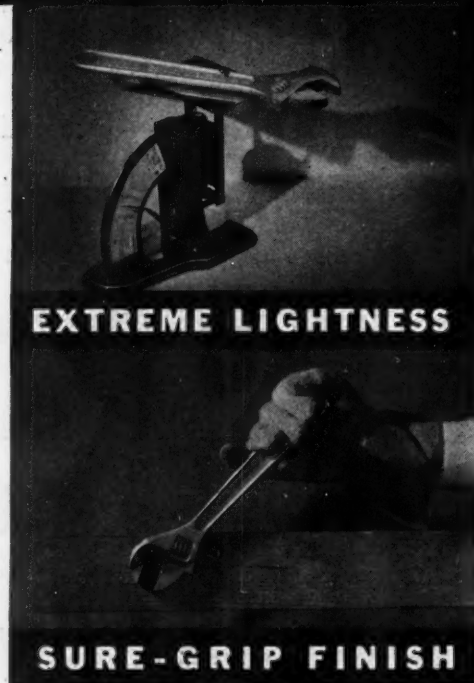
CRESTOLOY STEEL WRENCH

These modern adjustable wrenches with their lean symmetry, better balance and extraordinary strength make for faster and better work.

Forged from Crestoloy steel, they are one-third thinner than ordinary adjustable wrenches, yet actually more than *twice* as strong. A 10 inch wrench with a capacity opening of 1-1/8 inches weighs less than 13 ounces—handles dozens of different nut sizes.

All Crestoloy Wrenches are heavily chrome-plated—heads polished bright and handles specially finished to provide maximum “traction” even when hands are wet or oily. Seven sizes from 4 to 24 inches. Ask your supply house or write for the Crescent Catalog of guaranteed hand tools.

CRESCENT TOOL COMPANY
Jamestown, N. Y.



EXTREME LIGHTNESS

SURE-GRIP FINISH

RYBOLT

WINTER AIR CONDITIONER



· SERIES 600A7
with the new Series 600 Steel RYBOLT
Heating Element

**The modern
unit that
meets present
day needs!**

WITH the development of the industry homeowners have been taught to expect a lot from Winter Air Conditioning. Extravagant claims may make the initial sale but only dependable performance can keep a unit sold and cause the customer to recommend it enthusiastically within his circle of influence.

That's why RYBOLT Coal-fired Air Conditioning units are showing steady growth of prestige and making money for dealers and distributors. It's easy to sell RYBOLT units to homeowners because these modern complete units deliver everything the user has a right to expect in even, efficient, convenient and economical heating service.

Embodying every advanced feature required to meet present day needs, RYBOLT Winter Air Conditioning Units are a credit to the name that for more than a quarter of a century has stood for the best in home heating service. Write today for important information on this time-tested and complete line.

ATTRACTIVELY STYLED

The RYBOLT steel cabinets are symmetrically proportioned and gracefully designed with rounded corners. The finish is a handsome satin-like Morocco baked enamel in a rich green. The furnace cast iron fronts are finished in bright aluminum. In form and color the RYBOLT Unit presents a pleasing combination that will harmonize attractively with the decorative treatment of any recreation room or basement.



SERIES 157
with the famous Series 15
RYBOLT Heating Element

THE RYBOLT HEATER COMPANY
ASHLAND • OHIO

MORNING

... NOON ...

AND SUNDAY

Scully is on the job!

ALLOYS
ANGLES, HOT ROLLED and COLD ROLLED
ARCHES (CORRUGATED)
BABBITT
BANDS and HOOPS
BARS, HOT ROLLED
ALLOYS (HR and CF)
COLD FINISHED
ELECTRIC HIGH CARBON STEEL
REINFORCING
BEAMS and C. & B. SECTIONS
BEEF RAIL
BOLTS, NUTS, WASHERS, ALL KINDS
BORING and TURNING BARS and GRINDERS
BRACES, BOILER
CHAIN, ALL KINDS
CHANNELS
CHISELS
CHUCKS, STAYBOLT
CLAMPS, BOILERMAKERS
CLIPS, PATTERSON
CLEANERS, FLUE
CONDUCTOR PIPE
COPPER and BRASS
COUPLINGS, HOSE
CRAYONS, SOAPSTONE
CUTTERS
DARDELET RIVET and MACHINE BOLTS
DRILL RODS
EAVE TROUGH and FITTINGS
EXPANDERS, FLUE
FERRULES, COPPER
FLANGES, BOILER and TANK
FLOOR PLATES
GALVANIZED SHEETS, BARS, BANDS, ETC.
HANDLES, HAMMER
HEADS, TANK and FLANGE
HOISTS, HAND and POWER
IRON, STAYBOLT
LUGS, BOILER, TANK and SILD
MACHINERY, HAND and POWER
MANHEAD PLATES and FITTINGS
NAILS
PACKING
PAINT STICKS
PLATE STEEL, STANDARD QUALITIES
ABRASION RESISTING
COR-TEN and MAN-TEN
PLUGS, FLUE
RAILS and FITTINGS
REAMERS
SHAFTING
SHEETS
ABRASION RESISTING
COR-TEN and MAN-TEN
HOT ROLLED and UNIFORM BLUE
WELLSVILLE POLISHED
COLD ROLLED
STAINLESS STEEL
GALVANIZED and GALVANNEALED
LONG TERNE
CORRUGATED
U-S-S COPPER STEEL
SPRING STEEL BARS and SHEETS
STAINLESS STEEL
STRIP STEEL, CR and HR
TEES
TIRE, ROUND EDGE
TOOLS, HAND and POWER
for BOILER and IRON WORK
TROLLEYS
TUBES, BOILER
TURNBUCKLES
VALVES, BLOW-OFF
WELDING ROD and WELDERS
ZEES



"A CUSTOMER of ours was called out of church on a Sunday morning by a wire from an out of town customer of his requesting immediate shipment of cut I-Beams, Angles and Bars. Within two hours we had opened our warehouse, assembled a crew, cut and shipped the material."

— SCULLY ST. LOUIS WAREHOUSE

OF course, we are not regularly open for business on Sundays, but even then Scully customers can be sure of getting service when an emergency arises. For we understand that when a customer calls for steel, steel products, copper or brass and says the order is "Rush" he means it—and we act accordingly.

All eight Scully Warehouses operate on the same principle—that customers

always want prompt service no matter how large or small their orders may be. And our customers have learned that they can always depend upon Scully Service to be prompt, reliable and friendly.

Why not try Scully? Phone, write or wire the Scully Warehouse nearest you. And be sure to ask for a free copy of our complete Stock List and Reference Book. You'll find it handy and valuable.

SCULLY STEEL PRODUCTS COMPANY

Distributors of Steel, Steel Products, Copper and Brass

CHICAGO • NEWARK, N. J. • ST. LOUIS • BOSTON • ST. PAUL—MINNEAPOLIS
CLEVELAND • PITTSBURGH • BALTIMORE

UNITED STATES STEEL

USS

Scully
Service

MONCRIEF

Aristocrat Coal-Fired

WINTER AIR CONDITIONER



Also made with
Series "C" Cast
Heating Element

**Steel Heating Element—Extra
Well Built—Tight and Durable**

Here Are Features That Spell Definite Superiority

Positive gas-tight construction of heating unit—no bolt holes whatever in either combustion drum or radiator. Heavy steel ring supporting firebrick is welded, not bolted, to inside of shell.

Welded to combustion drum and radiator are flanged connections which are bolted together with heavy asbestos gasket. Heavy cast iron liner protects this connection.

Correct proportion of all sizes. The combustion drums increase in diameter as well as in height and the larger sizes are made of extra heavy thickness metal.

Heating cabinet is finely finished in green crackle. Metal floor seals it so dust can not leak in around bottom.

Wind Box, originated by Moncrief, distributes air evenly over heating surfaces.



Cutaway view

Plenum Baffle creates turbulence which equalizes temperatures of circulating air.

These and many other features make this a superior winter air conditioner in every particular. Automatic controls govern all operations. Specialized types are also made for gas and oil.

Send for catalogs.



THE HENRY FURNACE & FOUNDRY CO.

3473 E. 49th STREET

CLEVELAND, OHIO

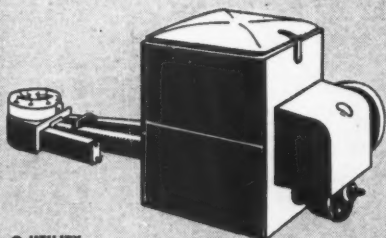
MANUFACTURER OF MONCRIEF CAST AND STEEL FURNACES

Here's Why

WINKLER SALES

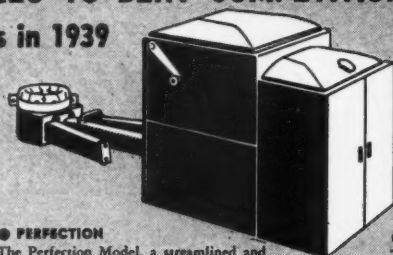
INCREASED OVER 2,000 UNITS IN 1938

4 GREAT DOMESTIC MODELS TO BEAT COMPETITION and Set New Sales Records in 1939



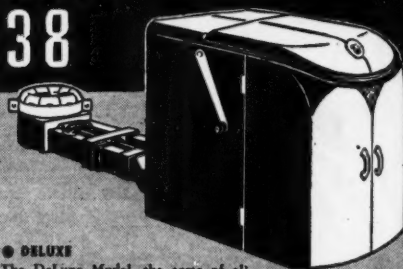
● UTILITY

The Utility Model embodies the famous Winkler inter-plan transmission with automatic release, no shear pin. Heavy hopper construction, sectional retort—a great stoker priced to beat mail order house competition.



● PERFECTION

The Perfection Model, a streamlined and beautiful stoker with the fully automatic super-power Winkler Transmission. Automatic Air Control, finger tip lid opener. "Perfection" throughout but no premium price.

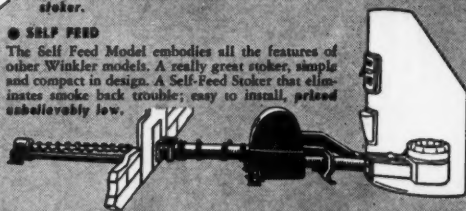


● DELUXE

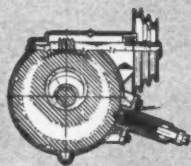
The DeLuxe Model, the acme of all stokers, beautiful in appearance, for that 20% of the people who want the best. Designed for the sledge hammer and rock crushing demonstration that has branded Winkler the unbreakable stoker.

● SELF FEED

The Self Feed Model embodies all the features of other Winkler models. A really great stoker, simple and compact in design. A Self-Feed Stoker that eliminates smoke back trouble; easy to install, priced unbelievably low.

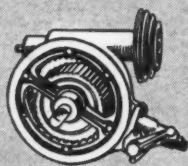


● FEATURES THAT MAKE WINKLER STOKERS SERVICE FREE AND EASIEST TO SELL



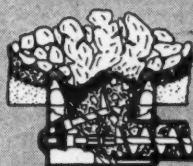
● FULLY AUTOMATIC RELEASE

The only Fully Automatic Release is on the Winkler Transmission. It completely releases, in case of feed screw overload, and automatically resets itself—all without attention. The greatest demonstration feature in the stoker industry.



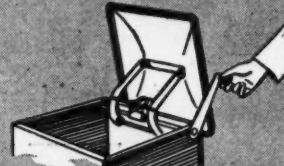
● WINKLER SUPER POWER TRANSMISSION

Simplest, most powerful, most rugged, and service free. That is the exclusive Winkler fully Automatic Transmission. After an easy presentation and the famous Winkler Power demonstration, prospects will have no other stoker.



● AUTOMATIC POKER

A major contribution to the art of burning extreme coking coals in small stokers, avoids segregation of fine and coarse coal in burner—softens or eliminates coke trees—levels fire and raises efficiency.

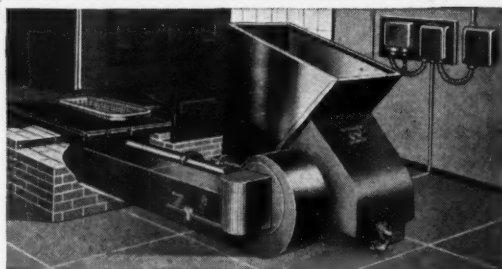


● FINGER TIP LID OPENER

Another Winkler Sales Appeal that permanently does a perfect job of sealing the hopper, an immediately apparent sales point that captures the buyer's interest.

● COMMERCIAL AND INDUSTRIAL

Winkler offers a complete line of fine Commercial and Industrial Stokers. Consider the value of all of these features: 1/8" steel hopper, 1/4" steel air housing, Winkler fully automatic inter-plan transmission, heavy deep ribbed dead plates that will not warp, exclusive retort that gives proper coal distribution. No Winkler tuyeres or dead plates have ever failed even in the most severe service. This line of large stokers is priced to get WPA jobs and the other large stoker contracts.



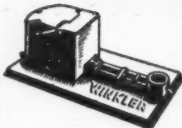
Plus A SALES AND ENGINEERING SERVICE THAT GIVES EVERY ADVANTAGE TO WINKLER DISTRIBUTORS



DISPLAY CUTAWAY Transmission with stand available to Winkler Distributors.



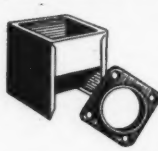
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U. S. MACHINE CORPORATION
LEBANON, INDIANA

WRITE... WIRE... OR CALL ABOUT THE GREATEST PROFIT OPPORTUNITY IN THE STOKER INDUSTRY

Member Stoker Manufacturers' Association

IT'S THE MARK
Of a Satisfied Customer



One sure way to make more money is to win satisfied customers who talk up your good work. Their word-of-mouth advertising means steady work and profits for you.

You can obtain their good-will and confidence quickly by using galvanized ARMCO Ingot Iron for all sheet metal requirements. This highly refined iron has demonstrated its lasting qualities and owner satisfaction over the past 33

years. Your customers will like the way its durability reduces upkeep costs. You will like the way its easy workability makes for neat forming and on-schedule erection.

For sheet metal work that must be painted, use galvanized ARMCO Ingot Iron PAINTGRIP sheets. The bonderized PAINTGRIP finish prolongs paint life and saves time and money in installation. Painters can follow you immediately without

need for acid-etching or weathering.

Explain these convincing features of ARMCO Ingot Iron and PAINTGRIP to your prospects. It's a powerful sales story that helps you outsell competition and makes for happy, loyal customers. It also brings you desirable repeat business. For prices and quick deliveries, just call your nearby Armco distributor. The American Rolling Mill Company, 1151 Curtis Street, Middletown, O.



ARMCO INGOT IRON

THE MAN WHO *always* PLAYS SAFE -



● Toncan Iron is made for the man who always plays safe—the factory owner who prefers to spend a little more for roofing material, and delay for many years repairs and re-roofing expense—the ship owner who realizes that first cost means little if the material he buys will withstand salt corrosion over a period of years—the home owner who appreciates a metal that cuts maintenance and replacement of pipe systems, flashing, gutters, conductors and duct systems.

Over the years, Toncan Iron has been developed to go one step farther along the road to permanence than the well-known and universally-accepted copper-bearing steels. Its formula is simple—just refined iron, copper and molybdenum alloyed to-

gether in the open-hearth furnace and carefully processed.

Whenever a corrosion-resisting ferrous metal is required, remember that Toncan Iron has twice the copper content of the best copper-bearing steel and, in addition, the alloy protection of molybdenum.



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Black, Galvanized and Galvannealed Sheets • Culverts • Black and Galvanized Pipe • Conduit • Ground Rods • Well Strainers • Plates • Wire and Welding Rod • Nuts — Bolts — Rivets • Bars • Sectional Plate Pipe • Roofing, Gutters and Downspouts • Tubing • Casing • Electrunite* Boiler Tubes

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TONCAN IRON

An alloy of refined open-hearth iron, copper and molybdenum
—that grows old slowly



GENERAL OFFICES: CLEVELAND, OHIO

UNION DRAWN STEEL DIVISION • STEEL AND TUBES, INC.
NILES STEEL PRODUCTS DIVISION • TRUSCON STEEL CO.
BERGER MANUFACTURING DIVISION



Our Publicity Campaign

Further along in this issue we publish an article by one of the men conducting our N. W. A. & A. C. Ass'n campaign to advance the acceptance of warm air heating and warm air conditioning. The article shows typical results as exemplified by clippings from magazines and newspapers and mentions the number of publications and their reader audience using the material furnished by the publicity agency. The results of the program, in terms of usage of material, seemingly exceed expectations.

There is, in our judgment, one job yet to be done. That is the task of correlating the publicity material with the contractors in every community who install warm air heating and winter air conditioning. Stated in another way, the task remains to acquaint the buying public interested in warm air heating and air conditioning with the names and addresses of men from whom final information can be obtained.

The publicity agency cannot do this. To include with each release the names and addresses of the local contractors who can submit plans and estimates would "kill" the news value of any release so far as the newspaper or magazine is concerned.

There is, however, one plan by which this need can be accomplished. As suggested by Mr. Ames, every one of the typical publicity releases can be re-typed by the local contractor quoting the material as coming from the contractor. Or, if there is a local association, the release can be quoted as of the association and a small advertisement on the same page giving members' names and addresses would be a definite "tie-in."

We believe that the ultimate value of the publicity program will only be secured when such "tie-in" with a certain contractor or a local association is carried out in every community where the newspaper is using the material. This might be harder to do with radio broadcasts, but group "tie-in" by means of spot announcements is a logical possibility.

The publicity agency is anxious to get releases into as many publications as possible. Direct mail from New York probably never will accomplish this end. Any contractor, therefore, whose local newspaper has not used material can obtain articles for re-writing from the agency for release to the

paper over the contractor's name. Readers interested in thus advancing the cause of the program and of publicizing themselves should make their wants known to the agency.

A New Sheet Metal Section

Beginning with this issue, readers will find a change in editorial make-up which inaugurates a second special section within American Artisan. This section, to be known as the Sheet Metal Section, is adopted in order that all articles relating to architectural sheet metal work, ventilation for air movement only, "blow pipe" work (including material collection, material separation, fume and gas removal), metal specialty fabrication, plus all the attendant shop fabricating problems of welding, grinding, polishing, soldering, forming and the extended use of old and new machines, may be grouped together for convenience. It is further planned to publish articles covering a wider range of problems than heretofore.

Whereas standardization has been coming rapidly into practice in warm air heating and winter air conditioning, just the opposite has been occurring in sheet metal work. Today, there are more different metals to work with; each of these metals now has numerous special types for special purposes; the equipment used and the methods of working vary type by type and metal by metal. In each general class of work there are today increasing variations of the basic operation. Take "blow pipe" work, for example. Whereas a few years ago there were a few common materials to collect or separate, today there are hundreds of materials being handled. Whereas steam and heat and a few basic acid fumes were encountered a few years ago, today health laws and chemical advancement has brought dozens of gases into common usage.

New materials, new requirements, new methods of working metal plus new equipment require the sheet metal contractor of this decade to be even more versatile than his predecessor of the "tinner" era. So, with this premise in mind, we bring together in one department all articles relating to this activity with the hope that a wider scope of material, more articles, closer attention to those finer details which make for progress will be of benefit.

Industry's National Publicity Campaign Gains Momentum

By Allen P. Ames
Director of the Program

H EATING contractors who have seen the official reports on the publicity campaign of the National Warm Air Heating and Air Conditioning Association realize that during the five months this campaign has been in progress warm air heating and air conditioning has received more attention in newspapers and magazines and in the "Household Hour" programs of radio stations than ever before in the history of the industry. This of course is the only satisfactory proof of the success of a publicity effort.

No one manufacturer or dealer, reading only his local paper and perhaps two or three magazines, can possibly comprehend the extent to which this campaign of consumer education is really getting to the consumer. Ours is a big country. Our people read nearly 20,000 daily and weekly newspapers and literally thousands of magazines. We listen in to broadcasts from more than 500 radio stations. The purpose of such a campaign, naturally, is to place information favorable to the industry in the largest possible number of these avenues of communication. The results, however, are being carefully checked by the Association and reports to companies supporting the campaign present definite evidence of splendid cooperation by editors and radio station managers.

Acceptance Due to Authoritativeness

The reason for this cooperation, we believe, is that the Publicity Bureau has been able to give the newspapers, magazines and radio stations information in which their readers and listeners are thoroughly interested. The Association's "Information Bureau" has succeeded, seemingly, in selling itself to editors, broadcasters and others as a central, authoritative source of authentic information relating not only to warm air furnaces but to all the appurtenances entering into complete air conditioning based upon air circulation.

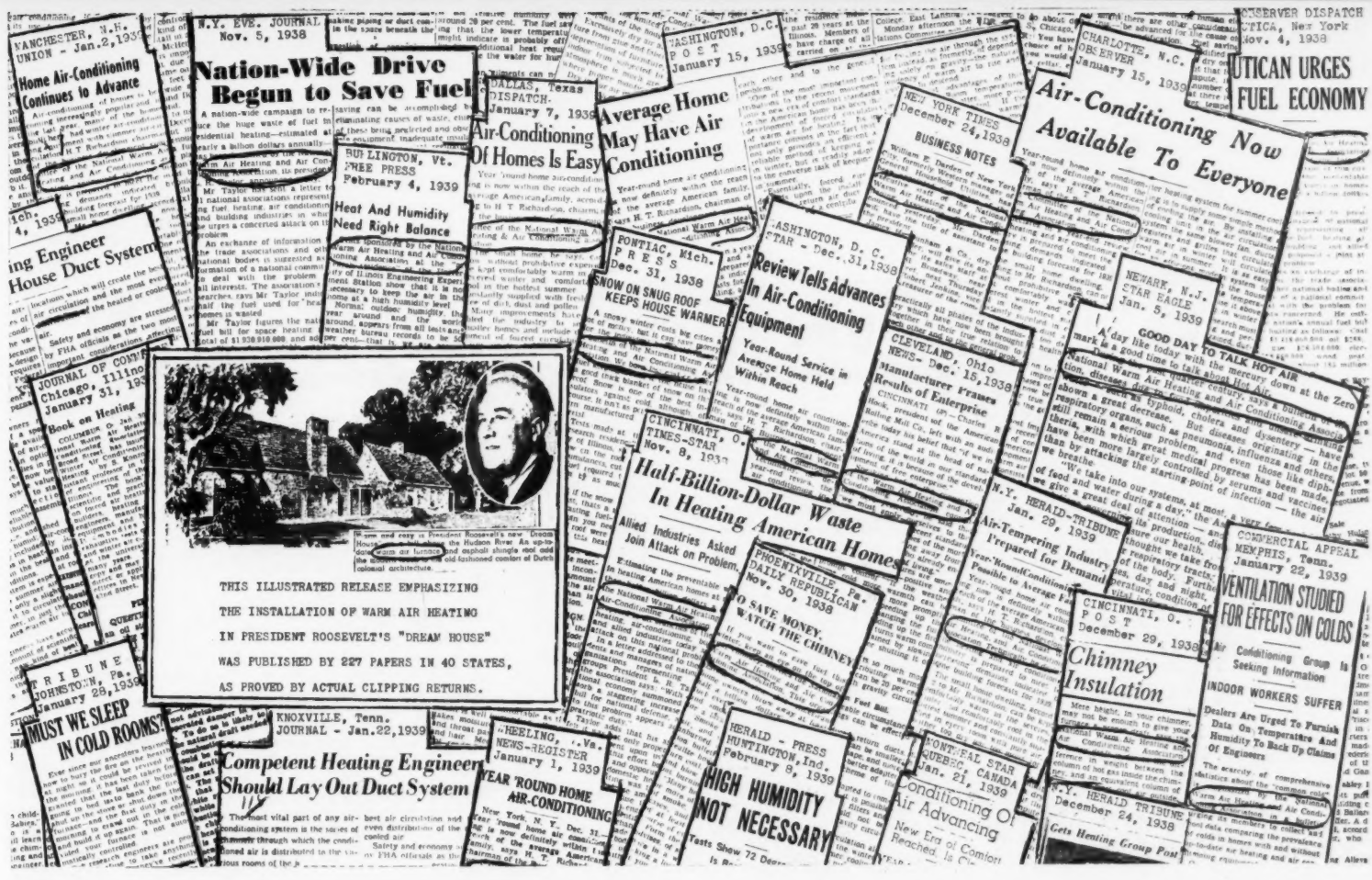


A good example of this confidence is the article appearing in the May issue of "Parents' Magazine" written and signed by Harry M. Hitchcock, the editor in charge of the Information Bureau. Mr. Hitchcock was invited to contribute this article and it states the case for warm air heating and air conditioning in terms which should produce sales throughout the United States. The circulation of this magazine is close to 500,000. Members of the industry who have not seen the article in the May issue of "Parents' Magazine" should lose no time in writing to the office of the Information Bureau for a free copy. It is sales promotion literature of the most effective kind because, in addition to the authority of the writer, it is backed by the approval of the well known magazine in which it appeared.

In addition to furnishing articles of this kind to editors who request information on specified topics, the Information Bureau sends out each month a bulletin containing a number of short articles on various heating and air conditioning topics. These items are written in newspaper style and they put the findings of the scientific research conducted at the University of Illinois into everyday language easy for the average newspaper reader to understand.

"Temperature Tips"

The title of this bulletin is "Temperature Tips." While its distribution to the manufacturing trade is limited to the companies contributing to the support of the publicity campaign, any dealer, contractor or installer in the retail trade can obtain copies free of charge by writing to these companies. The Association encourages the distribu-



tion of this publicity information to dealers not only because it contains information that should help them sell more equipment, but also because many dealers are in a position to place this information in their local papers.

The dealers have not been asked to contribute financially to the publicity campaign, but every

dealer has it in his power to assist the campaign by arranging for the publication of this publicity in his home newspaper. The best way to accomplish this is for the dealer to send some of these little articles to the editor of the local paper in the form of an interview or a statement by himself. The items selected should be retyped by the dealer and submitted on his own letterhead. The publication of such an item as a statement by a local dealer is, of course, good publicity not only for the industry as a whole, but for the dealer himself.

Temperature TIPS

From Information Bureau, National Warm Air Heating and Air Conditioning Association
11 WEST 42nd STREET, NEW YORK

APRIL, 1939

FOR RELEASE AT YOUR CONVENIENCE

SUMMER COOLING NOT SO DIFFICULT

Simple, inexpensive ways of lowering the temperature inside the home in a summer heat wave are now easy to find, says a bulletin of the National Warm Air Heating and Air Conditioning Association; but the particular method best suited to each individual case may depend upon a number of different factors. It is always best in any event to select a summer cooling method which will be readily adaptable to complete year-round air conditioning later on.

The climate with which you are dealing naturally makes a difference. One type of cooling may be best for a region where the summer is short but with occasional severe heat waves, and another where there is a long warm season with no marked climaxes. The general design of the house, its location and exposure must also be taken into account.

The simplest, least costly and most widely adaptable method involves only the use of cool night air drawn into and circulated through the house in the existing ducts of the warm air heating system by the forced-air blower fan. The method is particularly suited to climates in which cool nights prevail. Good results can be also accomplished by the use of a large capacity attic fan.

Above — Typical newspaper articles printed as offered or revised. Note wide distribution of cities and general high standing of papers. At left—Temperature Tips is printed on yellow paper, 3 1/2 by 8 1/4 inches and is mailed as a collection of short, newsy, timely articles.

Radio Service

The widespread use of the informal talks on warm air heating and air conditioning issued by the Bureau once a month is due to the same things that have made this publicity acceptable to newspaper editors. These radio talks are full of practical information of interest to every householder. They are in demand by the broadcasters in charge of so-called "Women's Hours" or "Household Hours" which are part of the morning sustaining programs of the large majority of radio stations. They are sent by the Bureau only to stations which request the exclusive local rights to include them in their programs. Such rights have been granted thus far to 121 radio stations, and these talks are sent only to stations which ask for them.

The Association has been careful not to put itself in the position of asking the radio stations for "free advertising." The Information Bureau merely notifies radio station managers that these talks are available and can be had on request. They have

(Continued on page 104)

THE PROBLEM CORNER

April Smoky Furnace Problem

American Artisan:

I notice your W. Va. reader has trouble with a smoky furnace and has reset three times. I suggest he take off jacket and fire up the furnace till it gets cherry red so if there are any defects they will show up. Sometimes when casting iron the iron is what the foundry men call (cold iron) and this leaves an opening as it does not mix properly. These openings are very hard to see when the furnace is cold, in fact you cannot see them and they act just like a knot in a board, one part expands and the cold parts remain unchanged.

We had two cases like this when I worked for our local furnace company. We put in a new firepot and never heard any more complaints.

J. VAN SPYKER, Mich.

American Artisan:

We had a couple of experiences with smoking furnaces which were so unusual they may be of interest to C. W. S.

On the first trouble job the owners applied wax to the floors above. The cold air face in the floor was directly above the vertical cold air pipe. The owners were careless in applying the wax and some of the wax particles dropped through the cold air face and fell on down the cold air pipe. When these particles were picked up by the cold air stream and came in contact with the hot castings the particles burned causing smoke. And does wax smoke?

On the second job, the owner had purchased Turkish rugs which shed a lint which, in turn, gathered in the cold air return. The lint particles were carried against the hot castings by the air stream and we believed were oxidized, result, more smoke.

Has the reader tried running a smoke test with the furnace set up as a stove—without casing?

A. L. ROTH, Colorado.

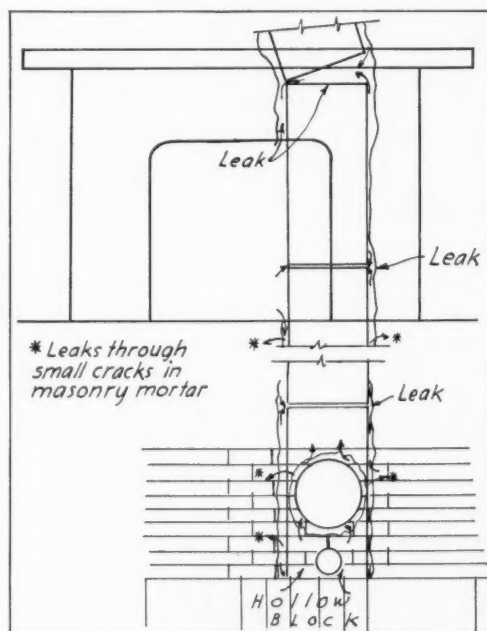
American Artisan:

In reference to C. W. S.' inquiry from W. Va., I hereby offer some suggestions. In the first place I believe there is no cast or even steel furnace that is positively smoke tight. If a steel furnace was assembled and all doors and the smoke outlet were sealed and filled with water, you would be bound to detect small leaks inside the casing. When a cast furnace is assembled as tight as possible of course it is smoke tight. After it has been good and hot once the casing can be taken off and the cement will be cracked and will not adhere to the joints firmly. I believe that in spite of manufacturers' claims, there is no cement made that will stand uneven contraction and expansion of furnace bowls, especially elongation of the circumference.

The principle of a furnace is to have sufficient draft so as to continually draw the products of combustion away from the ever present leaking joints. In order to do this, there must be sufficient flue velocity and the furnace must be correctly designed and operated. For the furnace to be checked, all front doors should fit tight and there should not be too large a check, so as to create as much suction as possible at the joints. If, however, the front doors are a sloppy fit, or the check is too large, there is not

enough suction created through the joints and any slight hole will leak out instead of in. If a furnace is tight all around as described it takes little or no check opening to check the fire.

I am submitting a drawing with practical suggestions for increasing flue velocity. A flue will leak close to its base, before it leaks above because the pull is stronger there. Burning paper in a 5-inch cleanout hole is not a proper test of flue draft where the draft must take care of an 18-inch to 24-inch grate that may be five feet or 6 feet away from



the flue and may have three or four 90-degree turns (through smoke collar, around radiator, down through feed section).

Here are some precautions—

1. Watch the foundation the bottom liner sits on and patch or put in a false bottom of concrete.

2. Seal the bottom flue liner to brick work as this section often leaks back of flue liner and through many small cracks in mortar joints in brick work or masonry. The leaks in the mortar joints can be detected by black spots where a candle flame will draw in.

3. Reach up inside as high as possible and seal first and second liner joints thoroughly.

4. If there is a mantle or grate on first floor, remove gas burner front as many times this will leave flue liner exposed. Seal all joints in liner and again seal liner to brick work every place you can see as most flue liners were not sealed tight in first place or cement has fallen out and draft will leak in back of liners and through these openings.

Remember, a little leak of 1/4-inch area is negligible, but 100 of these amounts to 25 square inches, a more effective draft check in the flue than if you cut a hole five foot square on side of smoke pipe. I have not mentioned such obvious things as other flue openings, loose thimble, improper height, etc.

R. E. NOBLE, Ohio.

Sand Blast Collecting

American Artisan:

In making up pipe for sand blast machines, we have used 16-gauge galvanized steel and 16-gauge galvanized iron sheets. These materials do a fair job, but do not seem to last as long as we think they should. Can you tell us of any better material? Lately we have been using abrasion resisting steel with Monel rivets, but these jobs have not been in long enough to show their lasting qualities.

P. B. H., Ohio.

Reply by

R. F. Jeske, Milwaukee.

To answer your letter, I appreciate your attitude in endeavoring to give your customer lasting material for this kind of work. Yet we must bear in mind that if sheet metal ducts do not wear out occasionally there will be less work for the sheet metal contractor.

To improve the lasting quality of the pipe, No. 14 or even No. 12 gauge could be used. I do not believe that Monel metal or abrasion resisting steel will give you much better service yet the cost will be higher.

A very good material to use in a service over a long period will be wire reinforced canvas suction hose, rubber lined. This comes in all sizes up to 8 inch diameter. It is very durable and will last a long time for this purpose and is also quite flexible. For instance a 5 inch diameter hose can readily be curved to a 4 foot diameter circle. We may add that this type of hose instead of metal pipe, is very frequently used for sand blast operation.

I wish to maintain a neutral attitude as to manufacturers of this type of hose and for that reason at this time do not wish to recommend any particular make or name. If you can not readily connect with a source of supply or obtain prices you may write to me and in that case I will give you approximate prices and supply source information.

"Average" Register Temperature

American Artisan:

Referring to your late discussion of the new Technical Code (October, 1937, issue in particular) you state that the "average" register air temperature was based upon a register about one-half distance from the bonnet. The data sheet you worked out shows the longest run to be

$$23 \text{ feet. Then } \frac{23}{2} \times \frac{1}{4} = \frac{23}{8} = 2.87 + 141^\circ = 143.87^\circ$$

Your calculations are based on the difference between the longest and shortest runs = 23 feet — 5 feet = 18 feet. It seems to me from the wording of the code this "average"

distance ought to be $\frac{23}{2}$ feet = 11.5 feet. If this is so then

the register air temperatures for the various rooms would be

11.5 12	11.5 11	11.5 20	11.5 5	11.5 18	11.5 23	11.5 9	11.5 10
4 .5 .12	4 .5 .12	4 8.5 2.12	4 6.5 1.62	4 6.5 1.62	4 11.5 2.87	4 2.5 .62	4 1.5 .37
141.00	141.00	141.00	141.00	141.00	141.00	141.00	141.00

140.88° (1) 141.12° (2, 9) 138.88° (3) 142.02° (4) 139.38° (5, 6, 7) 138.13° (8) 141.62° (10, 12) 141.37° (11)

These corrected temperatures, you will see, vary by 2 degrees in some cases from the temperatures shown on line 34 of your data sheet. I have figured both methods on several jobs and found there was more than 5 degrees difference in the corrected register temperature. Why was your data sheet based upon the difference between the longest and shortest run?

W. H. S., Penna.

Reply by

The Editors.

The code says that "register air temperature shall be based upon a register about average distance from the

bonnet." This wording can be interpreted in several ways, but in the installation pictured in our discussion, we find the most distant register to be 23 feet and the nearest register to be 9 feet, not counting the two registers in the basement. You might select the average distance as we did by subtracting 5' from 23' to get 18', or you might look at item 32 and find out that most of the second floor rooms are about 18' away and that 18' will, therefore, be a pretty good average.

Furthermore, there is no universal agreement at present on the amount of temperature drop per foot of duct. The code says one-quarter of a degree per foot; the Research Residence says one-half of a degree; and at least three well known engineers say the temperature drop is three-quarters to one degree per foot. Of course, this drop depends upon the velocity used in the mains. The drop will be higher with 500 feet velocity than for 1,000 feet velocity.

Be sure to keep this in mind. You select the "average" register in order to find the temperature you must set your fan switch which starts the blower. If your "average" register needs a 140-degree temperature and is 20 feet from the bonnet you would estimate a drop of $\frac{1}{4}$ degree for each foot or 5 degrees drop and set your fan switch to start the blower at 145 degrees. Of course, the air leaving the bonnet will not always be 145 degrees. Also, it is possible to have a job with 15 registers with one register 60 feet from the bonnet and the other 14 from 10 feet to 20 feet and "our" average would then be about 15 feet which is not an average between the longest and shortest or even one-half of the longest run of pipe.

Therefore, no matter which way you interpret the reading of the code to arrive at an average register temperature, to which is added, or from which is deducted, temperature drops according to the distance, you will not be far wrong and we suggest that you apply your own experience, which must be based upon your own design procedure.

Heating Ducts for Cooling

American Artisan:

A great many installations are being made in this area using mechanical circulation of air. Usually completely new duct systems are installed. After the job is balanced the question arises—are the ducts which are sized for heating of the proper size to handle the air volumes required for cooling?

W. W. T., Missouri.

Reply by

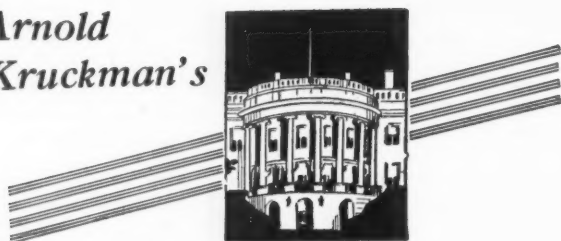
The Editors.

The problem presented in your letter of March 24 can, we believe, best be answered by stating that in the Research Residence in Urbana, the blower for winter heating handled 1675 cfm or about seven air changes per hour. For night air cooling, using the same blower, but changing the pulleys, the blower was speeded up to handle 2142 cfm or about 9.1 air changes per hour. The Research Residence staff estimate that the blower might have been speeded up still further to deliver 2620 cfm, or eleven air changes per hour without any noise and within the resistance of the supply system and the size of the motor.

With 1675 cfm used in winter, the air velocity in the two main trunks from the bonnet was 692 fpm and 748 fpm respectively, so it seems likely that main trunk velocities up to 1,000 fpm can be handled without noise and without too much resistance for summer cooling.

We suggest that where there is some certainty of installing cooling later, the supply system should be sized for cooling capacities and velocities (say 900 to 1,000 fpm) and the winter supply velocities accordingly be kept down to about 700 to 800 fpm. We suggest that where there is no cooling desired, higher winter velocities (approaching 1,000 fpm) at the bonnet will result in a saving of metal work, a reduction in temperature drop, and probably better pressure characteristics.

You can get a full discussion of the winter heating tests by buying Bulletin 266 or Bulletin 290, price \$1.00, from the Engineering Experiment Station, University of Illinois.



Washington Letter

BY the time this is published the FHA very likely will have authority from Congress to continue to insure loans for modernization under Title I of the National Housing Act, and to continue to make insured loans for the building of small homes under Title II, after June 30th. There is no doubt that the necessary amendments will be enacted; the only uncertainty is about the date. The Act is scheduled to come out of Congress in the middle of May and become law, with the President's approval, before June 1.

There has been considerable opposition to these extensions. The FHA itself asked Congress to allow several features to lapse. The Home Owners' Loan Corporation, the Farm Credit Administration, other Government finance agencies, and various organizations representing the banks, opposed the renewal as bad banking practice. The opinion repeatedly registered was that the financing amounted to a subsidy rather than a loan. Popular pressure from all parts of the country was so strong, and the demand for further stimulation of the building industry was so insistent, however, that Congress brushed aside all opposition, and evolved the amendments on the following bases.

Title I Changes

Title I, insured loans for modernization, probably will be continued at least for two years, ending with July 1st, 1941. However, the limitation of \$10,000 per loan, provided in the current law, will be reduced to \$2,500. The \$10,000 limit will expire on the last day of June, 1939. The decrease in the limit is not expected to affect the usefulness of the service, since the average modernization loan has been less than

\$500. The amended law also will compel the lending institution to pay the FHA an annual premium for insurance not exceeding 1%, and possibly as low as 1/2%. The provision authorizing insured loans up to \$2,500 for the building of new structures under Title I also is extended.

Title 2 Changes

The amendments to Title II raise the limit of insured obligations outstanding at any one time from \$3,000,000,000 to \$4,000,000,000. The FHA will be able to continue to insure loans for the construction of small homes, costing not more than \$6,000, for the building of which the owner is able to furnish 10% down payment. The mortgages are to continue to run 25 years, instead of 20; and under the proposed amendment, as written by the House, this feature of Title II will continue indefinitely; while, as written by the Senate, it will expire July 1st, 1941. The conflict will be ironed out in the final inter-Congressional conference. The Senate also would limit the FHA to 25% of its total underwriting in insuring these small homes, while the House makes no limitation. The Senate would limit FHA insurance on existing structures to 25% of its total underwritings, and would drop this feature after July 1st, 1940.

Section 210 of Title II, covering multi-family dwellings costing over \$6,000 and less than \$200,000, will be repealed, being covered more to the satisfaction of the FHA in Section 207. The Senate wishes to limit the cost of each room in a multi-family dwelling to \$1,350. The Senate also has incorporated a new mandate, at the behest of the Secretary of Labor, compelling those who build, or furnish any part of the

building of a multi-family dwelling, to pay prevailing wages. It is expected this provision, including an appropriation for the Department of Labor to defray the expense of enforcing the clause, will be adopted.

Small Business Loans

At least a half dozen bills intended to provide cashable credit for the small business man are frozen in both the Senate and the House. There is active opposition from banking groups and from big industrial groups. Apparently the new Secretary of Commerce, does not wish to urge immediate small business credit legislation. The most popular bills provide character loans, similar in character and mechanics to the insured FHA loans.

Secretary Hopkins recently proposed, informally, that the Reconstruction Finance Corporation be placed under control of the Department of Commerce, as part of the reorganization program. Jesse Jones, RFC chairman, promptly issued a statement which appears to show that small business has enjoyed material benefits through RFC. Since it was organized in 1932 RFC has made 7,166 loans, 52% being less than \$10,000, and 37% less than \$5,000. Loans in the last category average \$2,100 each. RFC estimates a business employing from 5 to 20 persons usually needs a loan ranging from \$2,000 to \$5,000. Character plays a large part in tipping the balance for RFC loans, but normally an applicant must have assets equal in value to 120% of the loan. The assets may be future orders, contracts, or inventories. Primary assets are real property and insurance.

Loan to Sheet Metal

A typical loan was made the other day to a *sheet metal business*. The net worth of the business was \$10,000. The owner, who employs between 8 and 11 men, had lost money consistently between 1932 and 1936. In 1937 and 1938 he made net profits, between \$1,000 and \$2,500 a year. His assets were in the form of contracts, accounts receivable, a little stock, and some equipment. The owner's salary had averaged \$2,300 annually during the past 5 years. He wished to acquire new equipment and new trucks, and to expand his plant. The RFC concluded he was making a sufficient

(Continued on page 93)

The Revised Gravity and Mechanical Warm Air Heating Code of Toledo, Ohio

In the March and April issues we published parts 1 and 2 of the revised heating ordinance of Toledo, Ohio. The regulations set forth in this installment apply either to gravity installations or to general specifications applying to all installations. Most of these sections have been revised—to make the meaning clearer, to eliminate faults of the earlier ordinance, or to rectify oversights of the first code. Readers wishing printed copies of the code may obtain information from the editors.

Warm Air Pipes in Basement

Section 406-A. All warm air pipes shall be made of bright tin not lighter than I-C, or of No. 28 Gauge galvanized iron. Side seams shall be locked seams. All joints shall be either double seamed or lapped not less than one and one-quarter ($1\frac{1}{4}$) inches. Such joints shall be matched beaded, or beaded and soldered, or riveted. All pipes and fittings shall be properly secured to ceiling or joists with strap hangers. Any pipe fourteen (14") inches or greater in diameter shall be made of material not lighter than I-X tin or No. 26 Standard Gauge galvanized iron.

Section 406-B. All warm air pipes in the basement shall have an upward pitch of not less than one (1") inch per linear foot.

Section 406-C. No warm air pipe shall run within one (1") inch of any combustible material unless such material is covered with asbestos paper and the paper covered with tin or iron. (Sec. 2).

Section 406-D. All basement warm air pipes shall be provided with dampers supported on both sides not more than two (2) feet from the casing, except as provided in Section 408-D. Where warm air pipes pass through a masonry wall, a metal thimble shall be installed, having a diameter at least one (1") inch greater than the pipe, and the pipe supported in such a manner that the air space is uniform on all sides. (Sec. 2).

Section 406-E. Where warm air pipes pass through or into unheated spaces separated from the furnace room, they shall be insulated with not less than three (3) layers of air cell asbestos paper or the equivalent. (Sec. 2).

Wall Stacks

Section 407-A. All wall stacks or wall pipes, heads, boots, ells, tees, angles, and other connections shall be double and made of metal not lighter than I-C bright tin. They shall be made double, from and including the boot or foot piece in basement to the top of every stack and register head, on all floors. There shall be a uniform air space of not less than five-sixteenths ($\frac{5}{16}$) of an inch, which must be maintained between the outer and inner walls of pipes and fittings of all kinds, styles, and descriptions. Such pipes, heads, boots, and other fittings shall be of the styles, or equal to those accepted by the National Board of Fire Underwriters. (Sec. 2).

Section 407-B. All stacks and fittings must be secured in place by lugs or straps attached to the outer walls of stacks and fittings. No nails shall be driven through these stacks or fittings at any point. No lugs or straps shall be formed by cutting holes in outer walls of stack or fittings.

No wall pipes or fittings shall be used which depend wholly on solder joints. The various members shall be made so that all joints are locked or soldered, and all members shall be attached to each other with air tight slip joints.

Section 407-C. Where stacks, heads, boots or other fittings go through the first floor, all open spaces around such fittings or stacks must be filled with asbestos cement or other incombustible insulating material to make the opening gas and dust tight. In no case shall any metal surface of stacks, heads, boots, or fittings conveying warm air come in contact with any wood, girder, joists, or flooring of the first floor.

Registers

Section 408-A. When baseboard or wall registers are used, they shall be securely sealed to the stack head in such a manner as to prevent any leakage of air between the head and the register.

Section 408-B. Floor, baseboard and wall registers shall be provided with double register boxes of tin or galvanized iron, with an air space not less than five-sixteenths ($\frac{5}{16}$) of an inch, between outer and inner boxes. (Sec. 2).

Section 408-C. Registers for warm air, and warm air pipes, stacks, and fittings, shall not be located in outside walls, unless insulated with one (1") inch air cell covering or its equivalent.

Section 408-D. In any gravity warm air heating system at least one (1) opening shall be without valve or louvers, and the pipes thereto shall be without damper.

Air Supply to Furnace

Section 409-A. The air supply to the furnace may be taken from outside or from within the building, or partially from the outside, and partially from within. In no case, however, shall air be supplied to any furnace from any basement, or furnace room not occupied as living quarters. If air is taken from a basement occupied as living quarters, only an amount equal to the warm air delivered to that room, shall be taken therefrom. (Sec. 2).

Section 409-B. The cold air return duct, where air is taken from within the building, shall have a net area throughout its entire length not less than the combined net area of all warm air pipes leading from the furnace. This may be contained in one or more ducts. No reverse incline or air trap will be allowed in any cold or warm air duct or pipe.

Section 409-C. When the cold air supply is taken wholly from the outside of the building, the supply duct at its most contracted point must equal or exceed eighty (80) per cent of the combined area of all warm air pipes leading from the furnace. (Sec. 2).

Section 409-D. Cold air ducts shall be constructed of metal not lighter than No. 26 U. S. Standard gauge, or tile, and shall maintain a constant net area throughout their entire length. All joints shall be dust tight. Horizontal, rectangular return ducts shall have at least ten (10) per cent greater area than the vertical connecting pipes. (Sec. 2).

Section 409-E. A boot or shoe shall be connected to

the casing at the base, and the opening shall not extend higher than level with the grate of the furnace. The width of the shoe shall be of proper dimension to make the area fully equal to that of the pipe or duct to which it is connected. The boot or shoe shall be of streamline, transition, construction. (Sec. 2).

Section 409-F. Whenever the space between joists is used to convey cold air, all bridging and bracing may be removed upon the consent of the Inspector only, and the bottom, covered with sheet metal, so constructed as to extend far enough below bottom of joists to provide the required area. The connection from cold air ducts to the boot or shoe shall be made of galvanized iron not lighter than No. 26 U. S. Standard gauge, and shall have a transition fitting, the top area of which shall be at least ten (10) per cent greater than the area of the connecting pipe. (Sec. 2).

Note: To reduce friction, and for the sake of cleanliness, it is recommended that the joists, and all wooden surfaces between joists, be lined with metal.

Section 409-G. When it is necessary to set the furnace over a pit and connect cold air under the basement floor, such pit or cold air trench shall not exceed eighteen (18) inches in depth below the base ring, and the width of the trench shall be of proper dimension to provide an area at least ten (10) per cent greater than the pipe to which it is connected. The connection between the cold air pipe or duct and the underground pit shall be made with a transition fitting as described in Section 409-F. (Sec. 2).

Section 409-H. The cold air grilles or faces shall be made of wood or metal. When set in floor, the top surface shall be flush with the floor. Where cold air face is placed in a window seat or side wall, the open space shall extend within one (1") inch of the floor line. The free area of cold air faces shall be equal to the free area of the ducts to which they are connected. (Sec. 2).

Section 409-I. Where the furnace in an existing warm air heating plant is removed and another furnace installed in its place, the return air system shall be brought into conformity with the requirements of Sections 409.

Section 410. Whenever furnaces or room heaters are supported by legs not less than five (5) inches high, and set on a combustible floor, the floor under same shall be covered with non-combustible material equal to three (3) sheets of air cell paper, plus one layer of galvanized iron extending not less than twelve (12) inches on sides and back of heater and thirty-six (36) inches in front of heater. (Sec. 2).

Pipeless or One Pipe Furnaces

Section 411-A. When but one duplex register is used for both warm air and cold air in a so-called pipeless furnace, the area of the cold air intake shall be at least equal to the area of the warm air outlet of the register. Sub-Section 405-B relative to casings shall not govern when this type of furnace is installed, but the following specifications shall be complied with: The inner and outer casing of this type furnace shall be not lighter than No. 26 U. S. Standard gauge. The inner casing may be black or galvanized iron. The outer casing shall be galvanized. A uniform air space shall be maintained at all points between the inner and outer casing. In no case shall the top of the heater be less than eighteen (18) inches from any ceiling, or joists above the furnace.

Section 411-B. Where joists are cut to accommodate such a furnace, headers shall be installed and braced.

Section 411-C. Section 302 for determining area of warm air pipe shall not govern in figuring a pipeless furnace.

Section 411-D. Where one warm air register is used, and separate registers for cold air supply are installed, the register box on the warm air shall be constructed double, with an air space of not less than two (2) inches between inner and outer wall.

Headers, When

411-E. Spacing of studdings and joists. Whenever it is necessary in installing or altering any warm air heating

system, to cut joists or supporting members, proper headers shall be installed, and additional supports shall be provided when necessary to prevent weakening of the structure, subject to the approval of the Division of Inspection.

Section 412. Where warm air stacks or risers shall enter the wall, in any building under construction, the studding shall be set directly over and under the adjacent joist, by the general contractor, leaving a net space of not less than fourteen (14) inches wide between studs, and between joists.

Smoke Pipes

Section 413. The smoke pipe shall be consistent with the location of the furnace. It shall be made of metal not lighter than No. 24 U. S. Standard Gauge, and not less than the full size of the smoke collar of the furnace throughout its entire length. It shall have no openings for attaching fire place, stove, range, water heater, gas or ventilating pipe. It shall be locked seamed or riveted; all joints shall lap not less than one and one-half (1½") inches, and it shall be rigidly secured with at least three (3) metal screws in each joint and metal straps or hangers when necessary. Cast iron smoke pipe may be used. All smoke pipe shall be provided with check dampers placed on the side of the pipe or at the end of a tee; when cast iron smoke pipe damper is used it must be placed between the check damper and the furnace and supported on both sides of the pipe. (Sec. 2).

Section 414. Where the smoke pipe enters the flue, a thimble shall be cemented into the chimney and the connection thereto made air tight. Should any smoke pipe come within eighteen (18) inches of any combustible material, such combustible material must be covered with asbestos paper and a metal shield so fastened that a two (2) inch air space exists between the shield and the combustible material. This shield shall be not less in width than twice the diameter of the smoke pipe, and shall extend the full length of the pipe. In no case shall a smoke pipe pass through a combustible partition. (Section 2).

Chimneys

Section 415. The chimney must be absolutely smoke tight throughout its entire length, and shall extend at least three (3) feet above the highest point at which it comes through the roof of the building, and at least two (2) feet above any ridge within ten (10) feet of such chimney. (Sec. 2).

Section 416. If built of a single thickness of brick or of cement blocks, it shall be lined throughout its entire length with fire clay flue lining, of not less than three-fourths (¾) inch thickness. Flue lining shall be laid in mortar and made air tight. (Sec. 2).

Section 417. The furnace flue must have no other opening for attaching fireplace, furnace, stove, range, water heater, gas or ventilating connection. The chimney thimble shall be furnished and installed by owner or building contractor; size and location shall be specified by the heating contractor. (Sec. 2).

Section 418. Flue linings shall start at least four (4) inches below the bottom of smoke pipe opening of flue, and shall be continuous the entire height or length of the flue. It is recommended that chimney base be built solid up to within four to six inches below smoke pipe opening. (Sec. 2).

Section 419. If necessary to offset the flue, it shall be done in such manner as not to reduce the cross sectional area, nor create a ledge or obstruction, where loose material or soot may lodge. (Sec. 2).

Section 420. The narrowest dimension shall be not less than eight (8) inches, and no flue smaller than 8"x8" rectangular or eight (8) inch diameter round will be accepted when hard coal or coke is burned, nor 8"x12" rectangular, or ten (10) inch round for soft coal or wood, by the Division of Inspection. (Sec. 2).

Section 421. In no case will a chimney less than twenty (20) feet in height from the grate level be considered adequate by the Division of Inspection.

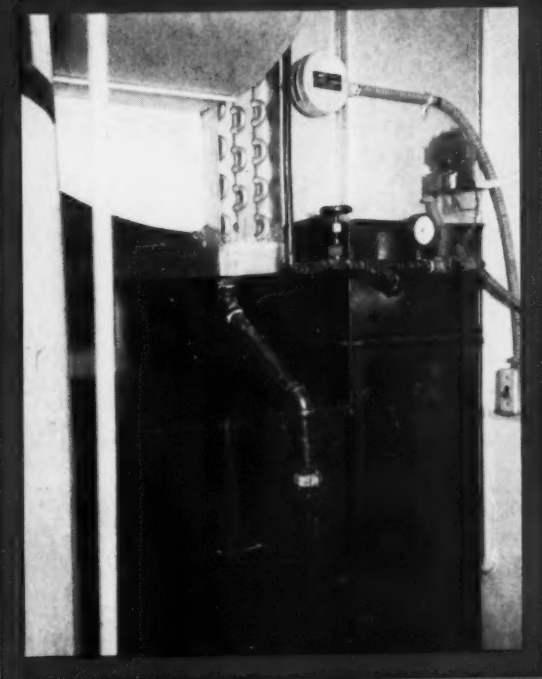
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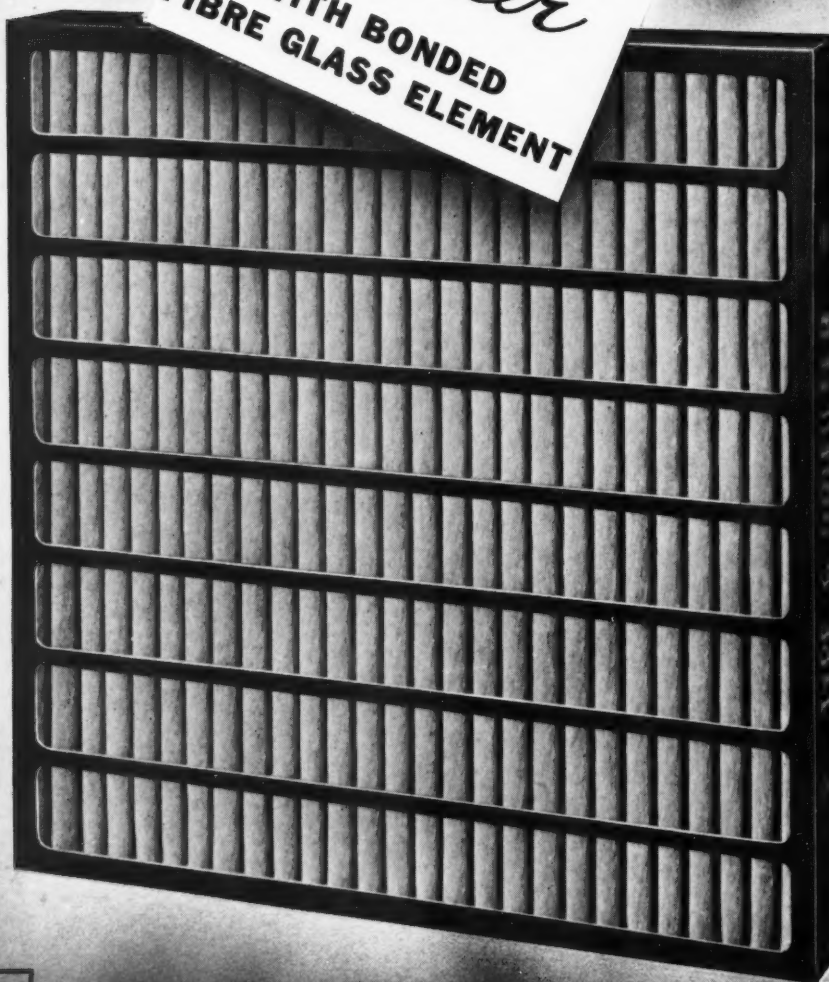
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GASCO INSTALLATION GUIDE

RECOMMENDED PRACTICES FOR INSTALLATION
OF
GAS WINTER AIR CONDITIONING IN NEW HOMES

For the guidance of Architects, Builders, Contractors, Heating Engineers and Installers as well as to assist the home owner in securing the best in gas winter air conditioning.

PREPARED BY
METROPOLITAN HEATING AND AIR CONDITIONING COUNCIL
In Cooperation With The
METROPOLITAN SERVICE MANAGERS COUNCIL
NEW YORK

To qualify as a gas winter air conditioning system, the equipment should be designed to furnish simultaneously all of the four recognized functions of winter air conditioning, namely: To give controlled heat, controlled circulation, humidity, and filtering.

All installations should be in conformity with local building and air conditioning codes and the local fire department regulations as well as those of other bureaus having jurisdiction. Local gas company recommendations for installing external flue connections, gas piping, electric wiring, controls, etc., should be followed when preparing specifications or asking for bids from heating contractors.

I. Approval Required

The gas equipment should be approved by the American Gas Association and the Gas Company.

II. The Heating Unit

A. Size

The heat loss of the house should be determined by heat loss survey.

The following table provides a convenient method of selecting the appropriate size furnace taking care of satisfactory capacity for quick pick-up under thermostatic control and for heat losses from the duct work.

This table is intended to give the correct size of gas winter air conditioner to get the minimum operating cost. No further allowances are necessary or desirable in selecting equipment.

The insulated house table applies to completely insulated houses using full stud thickness of fill type insulation and 4" of fill type insulation in the ceiling. The reason these factors are higher than in the uninsulated table is that the insulated house is a relatively larger house for the same heat loss.

Houses not insulated to the same degree as specified above will fall somewhere between the values given for the insulated and the uninsulated constructions.

B. Fans and Motors

1. The fan should have sufficient capacity in cubic feet

The Gasco Installation Guide

H. P. Morehouse, in the April issue, described conditions which brought into imposition the Gasco Guide specifications covering gas-fired, winter air conditioning systems. Because the April article aroused attention, we publish here and in June, to follow, the guide itself.

per minute to deliver against the static head of the system a volume of air in cubic feet per minute equal to $7\frac{1}{2}$ times the M Btu per hour input to the furnace. This is based on a temperature rise thru the furnace not to exceed 100° F.

2. Fans should be capable of delivering the volume of air as determined by the design calculations against a system total pressure of at least .15" water column, exclusive of unit and filters.

3. Fan motors should have a capacity to handle the calculated air volume against the total resistance of the system without overheating.

III. Erection of Furnace

Furnace should be erected in accordance with manufacturer's instructions. There should be no leakage between
(Continued on page 102)

TABLE I. SELECTION OF CORRECT SIZE GAS WINTER
AIR CONDITIONER
INSULATED HOUSE

HEAT LOSS OF HOUSE FROM SURVEY. M BTU/HR.	SIZE IN M BTU/HR. INPUT	HEAT LOSS OF HOUSE FROM SURVEY. M BTU/HR.	SIZE IN M BTU/HR. INPUT
10	20	110	214
20	40	120	232
30	60	130	250
40	80	140	269
50	100	150	288
60	119	160	305
70	138	170	322
80	157	180	340
90	176	190	358
100	195	200	376

UNINSULATED HOUSE

HEAT LOSS OF HOUSE FROM SURVEY. M BTU/HR.	SIZE IN M BTU/HR. INPUT	HEAT LOSS OF HOUSE FROM SURVEY. M BTU/HR.	SIZE IN M BTU/HR. INPUT
10	16	110	171
20	32	120	186
30	48	130	200
40	64	140	215
50	79	150	230
60	95	160	244
70	110	170	258
80	125	180	272
90	141	190	286
100	156	200	300

Air Conditioning Facts From the Research Residence

Factors Affecting the Cooling Load

By S. Konzo

Special Research Assistant Professor
Engineering Experiment Station
University of Illinois

IN the preceding issue a detailed method was presented for calculating the cooling load, or summer heat gain, for a building. The sources of heat gain were considered as consisting of:

- Item 1—Heat Transmission Through Walls not Exposed to Sun
- Item 2—Heat Transmission Through Walls Exposed to Sun
- Item 3—Heat Transmission Through Windows and Doors not Exposed to Sun
- Item 4—Heat Transmission Through Windows Exposed to Sun
- Item 5—Heat Transmission Through Ceilings
- Item 6—Heat Transmission Through Floor
- Item 7—Heat Brought in by Infiltration or Ventilation Air
- Item 8—Heat Given Off by Occupants
- Item 9—Heat Given Off by Electric Motors
- Item 10—Heat Given Off by Electric Lights
- Item 11—Heat Given Off by Appliances.

In this article some of the minor problems related to the subject of heat gain, as well as some of the means of reducing the heat gain, will be considered.

Effect of Awnings in Reducing Heat Gain

As a general rule it is cheaper to protect the building from heat gain with the use of awnings and insulation than it is to allow the heat to enter the building and then attempt to absorb it by means of additional refrigeration equipment. Hence the first step in any contemplated cooling installation is to inspect the building with one purpose in mind; namely to reduce the heat gain in the structure.

In this connection the use of awnings on windows exposed to the sun is recommended. The results of tests made in the Research Residence, as shown in Fig. 1, indicate that in a residence having considerable glass exposure the cooling load can be reduced approximately 20 to 30 per cent with the use of awnings at all windows on east, south, and west exposures. The windows on the east and west walls, which are exposed to the sun, should be given primary consideration since the solar intensity on such walls, as shown in Fig. 2, is of much greater magnitude than the intensity on the south wall. If possible, however, even the windows facing the south

should be protected by awnings. As an indirect benefit it will be observed that awnings also serve to shade the walls beneath the window, and hence tend to reduce the heat gain through walls which normally are exposed to the sun. (See photograph on cover showing south wall of Research Residence and the large shaded areas attributable to the use of awnings.)

In some cases where the use of awnings is not feasible the heat gain through windows can be reduced to some extent by the use of Venetian blinds or fully drawn shades, particularly if the surface finish which faces the sun is aluminum paint or white paint.

Use of Insulation in Reducing Heat Gain

Experimental data on the effectiveness of varying amounts of insulation in reducing the flow of heat from the outdoors to indoors under summer conditions are meager. The problem is a most complicated one. The following discussion based upon calculated values obtained from tests conducted in the Research Residence, therefore, should be considered as indicative of the general tendency rather than of specific results.

The calculated values of the ten component items of the cooling load shown in Table 1 have been reproduced from Illinois Engineering Experiment Station Bulletin 305. "In this particular case practically one-quarter of the calculated cooling load may be attributed to the heat transmission through the walls which were not exposed to the sun (Item 1), and approximately one-tenth to the heat transmission through walls which

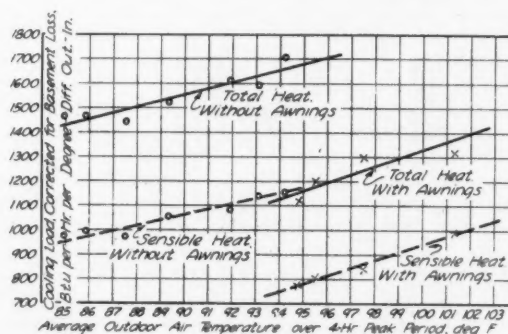


Fig. 1—Reduction in the cooling load with the use of awnings on the Research Residence. (U. of I. Eng. Exp. Sta. Bulletin 290)

TABLE 1
CALCULATED VALUES FOR COMPONENTS OF
COOLING LOAD

Item No.	Source of Heat gain	No Insulation used*		Assumed insulation used†
		Heat gain B.t.u. per hr.	% of Cooling load	Heat gain, B.t.u. per hr.
1.	Walls, not exposed to sun..	9080	24.3	4503
2.	Walls, exposed to sun.....	3460	9.3	1384
3.	Windows, not exposed to sun	6740	18.0	6740
4.	Windows, exposed to sun...	3120	8.4	3120
5.	Ceiling	9050	24.2	2508
6.	Floor	1390	-3.7	-1390
7.	Ventilation	4500	12.0	4500
8.	Occupancy	1600	4.3	1600
9.	Motors	1200	3.2	1200
10.	Lights	0	0.0	0
Totals		37,360	100.0	24,165
		Btu per hr.		Btu per hr.
		Reduction = 35.3 per cent		

*Assumed no insulation used (Data from U. of I. Eng. Exp. Sta. Bulletin 305).

†Assumed sufficient insulation used to reduce U_w and U_c to 0.1.

were exposed to the sun, (Item 2). That is, approximately one-third of the total load may be attributed to the heat transmission through the walls alone.—The amount of heat transmitted through the ceiling (Item 5) is exceedingly large, due not only to the relatively high coefficient of heat transmission, but also to the very large temperature difference that exists between the attic space and the indoor air."

If, by the addition of approximately two inches of fill insulation, the overall coefficient, U , of heat transmission for both wall and ceiling could be reduced to 0.1 B.t.u. per hr. per sq. ft. per deg. F., the calculated heat gain of the house could be reduced from 37,360 B.t.u. per hr. to 24,165 B.t.u. per hr. or a reduction amounting to 35.3 per cent.

In addition, as indicated from unpublished data obtained during tests conducted in the summer of 1938, the time lag for the passage of heat through the walls would be increased so that the cooling load would be distributed more uniformly with respect to the time

TABLE 2
COEFFICIENTS OF EMISSION

From "A Study of Thermal Radiation," Bulletin 29 of Texas A. and M. by T. R. D. Eddy and J. H. Nelson

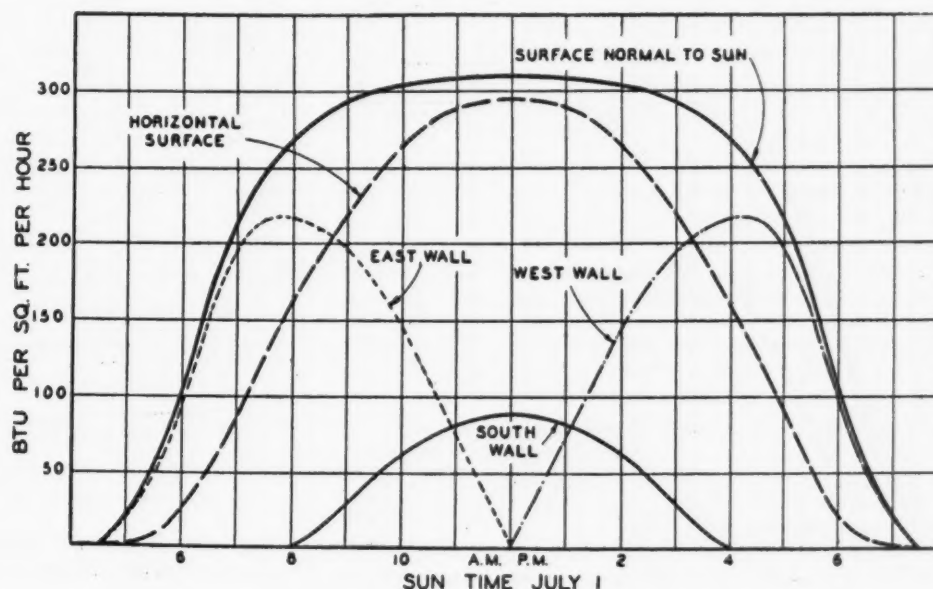
Material	Emissivity
Black Body (theoretical).....	1.00
Bare Concrete	0.83
Alabastine	0.79
Acme Cement Plaster.....	0.79
Lime and Sand Plaster.....	0.85
Paint (white lead).....	0.77
Paint (aluminum)	0.36

of day. Also these tests made under actual service conditions have indicated that the inner surface temperature of the walls facing the occupant do not attain as high a temperature when the walls were well insulated as when no insulation was used. Under summer conditions the maintenance of cooler wall surfaces will result in more comfortable conditions indoors since less heat will be radiated from the wall surfaces to the occupant. Hence from the standpoint of the reduction of heat gain and from the probable increase in comfort resulting from cooler rooms and cooler wall surfaces, the use of adequate amounts of insulation in the wall and ceiling should be given serious consideration. Furthermore, as indicated in this example showing the reduction in the calculated cooling load, the use of artificial means of cooling may, under certain conditions, become economically feasible to the home owner.

Roof Surfaces and Roof Temperatures

The energy from solar radiation received upon a roof surface is partly reflected, partly transmitted to the outdoor air by convection, and partly transmitted through the roof to the space below, as illustrated in Fig. 3. The solar intensity on a horizontal roof surface is exceedingly large, as shown in Fig. 2. The proportion of the total solar radiation which is absorbed by the surface is designated as the "coefficient of emission." As shown in Table 2, which is from data obtained by the Texas Engineering Experiment

Fig. 2—Curves showing solar intensity normal to sun, on horizontal surfaces and on walls for July 1. (Reprinted by permission — From ASHVE Research Report No. 923, "Heat Transmission as Influenced by Heat Capacity and Solar Radiation" by F. C. Houghten, J. L. Blackshaw, E. W. Pugh, and Paul McDermott.)



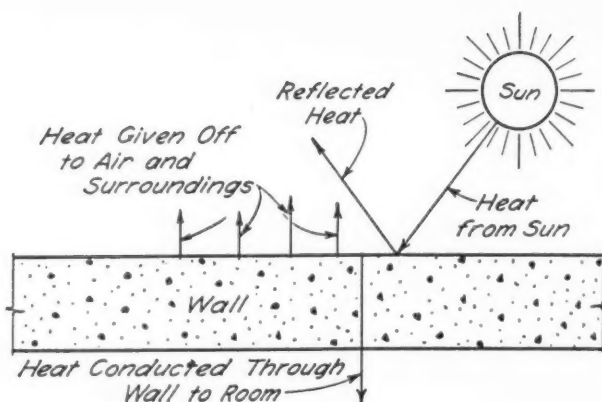


Fig. 3—Diagram showing effect of solar radiation and resulting heat reflection or transmittal.

Station, the coefficient of emission for a surface exposed to solar radiation is largely dependent upon the color and character of the roof surface. Ordinary dark colored roof surfaces, therefore, form very good absorbers of solar radiation. In the case of black, flat-deck, roofs the heat gain through the roof can be markedly reduced by the application of whitewash or aluminum paint.

Similar data for temperatures beneath a glass roof, as published in the official organ of the Institution of Heating and Ventilating Engineers (British) are given in Table 3. It is apparent that surface treatment of horizontal glass exposures is most essential.

In the case of the Research Residence, as shown in the top portion of Fig. 4, maximum roof surface temperatures as high as 170 deg. F. have been obtained on

TABLE 3
TEMPERATURES BENEATH GLASS

Extract from "Heating Research Work," appearing in "Domestic Engineering, Heat and Ventilation," official organ of the Institution of Heating and Ventilating Engineers (British). November 1930. Vol. 50, No. 11.

During the summer of 1929, experimental proof was obtained of the important effect which whitewashing or similar surface treatments could have upon the amount of solar heat transmitted by a glass roof. Tests were made with whitewash and green casein distemper. The comparative values of the above treatments are well seen from the following table, which shows corresponding temperatures established when the temperature under the clear glass was 230 deg. F.:

Condition of Glass	Temp. Deg. F.
Clear	230
1 coat of whitewash.....	129
2 coats of whitewash.....	77
1 coat of green distemper.....	156
2 coats of green distemper.....	129

Surface treatment is also of value for other types of roof. An interesting comparison has been made of ordinary bituminous roofing felt and one the surface of which had been impregnated with flake aluminum. The two felts were laid on one inch boarding and exposed to sunshine. The following maximum temperatures were attained by the felts:

	Maximum Temp. Deg. F.
Standard shade	69
Surface of ordinary felt	150
Surface of aluminized felt	119

a clear bright day. The maximum air temperatures which were obtained in the attic on the same day were approximately 113 deg. F., whereas the maximum outdoor air temperature was 10 deg. F. lower. An attic space may be considered as a buffer between the intensely hot roof surface and the living quarters. In certain types of building construction in which the underside of the roof is directly exposed to the occupants, extremely unfavorable conditions are maintained, not only from the resulting high air temperatures in the room, but also from the radiant panel heating effect of the roof surface. Hence in new house construction an attic space should be considered as essential. Furthermore the attic space should be adequately cross ventilated by large louvered openings placed in the ends of the attic space to receive the full benefit of existing winds. The tests made in the Research Residence indicated that natural ventilation of the attic space seemed to be sufficient. The additional heat removal effected by an attic fan which was circulated during the day was not great enough to produce a noticeable difference in the temperatures in the rooms below the attic. It is probable, however, that in extremely small attic spaces or those in which no natural cross ventilation can be obtained that an attic fan or roof ventilator may be found necessary.

Roof temperatures may also be reduced by the use of a water spray on the roof surfaces and by the use of water ponds on the roof. The evaporation of water from the roof tends to reduce the temperature of the roof surface, in some cases much below the prevailing outdoor dry-bulb temperature.

Time Lag in Heat Transmission

The most common method for calculating the cool-
(Continued on page 94)

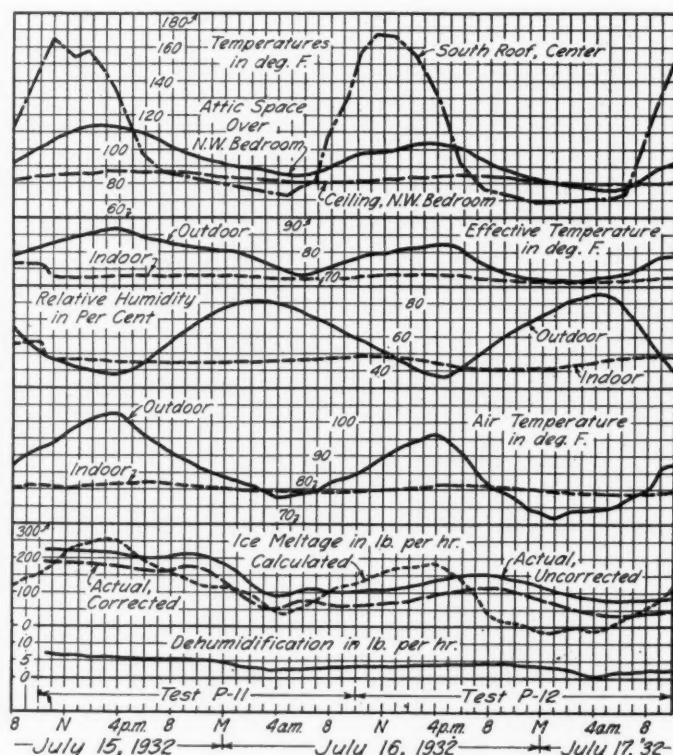


Fig. 4—Temperatures obtained in the Research Residence on a hot day. (U. of I. Eng. Exp. Sta. Bulletin 290)

Precalculated Engineering

By G. A. Voorhees

ALTHOUGH the accompanying tables and those in the last installment, do not include rooms having heat losses beyond 25,000 Btu per hour (25 Mbh), the tables may be applied to larger rooms by breaking down the heat requirement into components of less than 25 Mbh each.

Suppose for example, that a room requires heat delivery of 36,000 Btu per hour (36 Mbh), and further that its register temperature is to be 145 degrees and the duct air velocity is to be 600 fpm.

Since the accompanying Table 47 which applies to a register air temperature of 145 degrees, does not extend up to 36 Mbh, take one-half of this value, 18 Mbh, and then double the corresponding duct area. For 18 Mbh and 600 fpm the table shows the required area to be 57 square inches. Hence, for a room having a loss of 36 Mbh, the duct area would be $2 \times 57 = 114$ square inches.

Btu Limits of One Register

Usually, any room in a dwelling or similar building, with a heat loss of more than 25,000 Btu per hour, would need (in the estimation of most designers) two or more warm air registers. Some very careful installers, for instance, set a limit of 12,000 Btu per hour as the maximum delivery from one register. They argue that a room requiring between 12,000 and 24,000 Btu per hour, needs at least two warm air supply registers to insure adequate *distribution* of the warm air within the room; if its heat requirement is between 24,000 and 36,000 Btu per hour, it needs not less than three supply outlets, etc. Others who formerly felt that 12,000 Btu delivery per outlet was a reasonable limit with the older types of registers, have now advanced their limit to some such higher figure as 15,000 Btu per hour where a proper diffusing type of grille is installed.

The use of two or more supply registers in one room may introduce another problem because of a possible difference in duct lengths which in turn, will result in different register air temperatures. Also, a difference in equivalent lengths of the runs will require different duct velocities to equalize friction.

For example, assume that a room with a heat loss of 30,000 Btu per hour has two warm air runs as follows:

Run No. 1:

Actual length, 16 feet.

Number of 90-degree turns, 2.

Equivalent length for determination of velocity as explained in the last installment and allowing 10 feet

of straight pipe as the equivalent of each 90-degree change in direction, $16 + (2 \times 10) = 36$ feet.

Run No. 2:

Actual length, 28 feet.

Number of 90-degree turns, 5.

Equivalent length, $28 + (5 \times 10) = 78$ feet.

A Low Temperature Problem

Assuming for this problem, a bonnet temperature of 140 degrees, and a temperature drop of 0.5 degrees per foot of *actual* duct length, the corresponding register temperatures will be:

Run No. 1:

$140 - (0.5 \times 16) = 132 = 130$ (to nearest 5 degrees)

Run No. 2:

$140 - (0.5 \times 28) = 126 = 125$ (to nearest 5 degrees)

From the velocity chart (Fig. 2, April issue) the duct velocities corresponding to the equivalent lengths will be:

Run No. 1, having 36 feet equivalent length, 600 fpm.

Run No. 2, having 78 feet equivalent length, 450 fpm.

Since the total heat requirement of the room is 30 Mbh and there are two supply outlets, it is reasonable to assume that each will be called upon to deliver 15 Mbh and the duct areas are determined as follows.

Run No. 1 which has a design register temperature of 130 degrees, is covered by Table 44 in which it is seen that to deliver 15 Mbh at a velocity of 600 fpm within the duct, requires 57 square inches of duct area.

Run No. 2 with a design register temperature of 125 degrees, is covered by Table 43 which shows that the delivery of 15 Mbh at a duct velocity of 450 fpm, requires 82 square inches.

For this problem a low bonnet temperature with correspondingly low register temperatures, has been purposely chosen to emphasize the important fact that low register temperatures require larger ducts for the delivery of a given quantity of heat (if frictional resistance is to be kept down to a reasonable and economical point). Thus, in a system designed for low register temperatures, a greater number of warm air outlets are usually considered necessary because 2-in. x 4-in. studding spaced 16 inches on centers, make it impractical to install a sidewall register head larger than 3½-in. x 14-in. and such a register head has a free area of only 49 square inches.

To a reasonable extent, air velocities in the ducts can be stepped up to compensate for lack of duct area

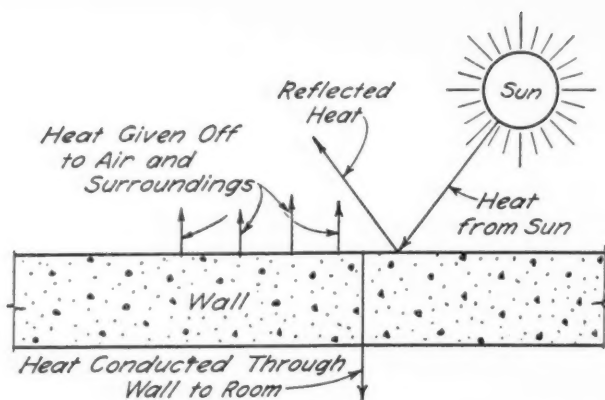


Fig. 3—Diagram showing effect of solar radiation and resulting heat reflection or transmittal.

Station, the coefficient of emission for a surface exposed to solar radiation is largely dependent upon the color and character of the roof surface. Ordinary dark colored roof surfaces, therefore, form very good absorbers of solar radiation. In the case of black, flat-deck, roofs the heat gain through the roof can be markedly reduced by the application of whitewash or aluminum paint.

Similar data for temperatures beneath a glass roof, as published in the official organ of the Institution of Heating and Ventilating Engineers (British) are given in Table 3. It is apparent that surface treatment of horizontal glass exposures is most essential.

In the case of the Research Residence, as shown in the top portion of Fig. 4, maximum roof surface temperatures as high as 170 deg. F. have been obtained on

TABLE 3
TEMPERATURES BENEATH GLASS

Extract from "Heating Research Work," appearing in "Domestic Engineering, Heat and Ventilation," official organ of the Institution of Heating and Ventilating Engineers (British), November 1930. Vol. 50, No. 11.

During the summer of 1929, experimental proof was obtained of the important effect which whitewashing or similar surface treatments could have upon the amount of solar heat transmitted by a glass roof. Tests were made with whitewash and green casein distemper. The comparative values of the above treatments are well seen from the following table, which shows corresponding temperatures established when the temperature under the clear glass was 230 deg. F.:

Condition of Glass	Temp. Deg. F.
Clear	230
1 coat of whitewash.....	129
2 coats of whitewash.....	77
1 coat of green distemper.....	156
2 coats of green distemper.....	129

Surface treatment is also of value for other types of roof. An interesting comparison has been made of ordinary bituminous roofing felt and one the surface of which had been impregnated with flake aluminum. The two felts were laid on one inch boarding and exposed to sunshine. The following maximum temperatures were attained by the felts:

	Maximum Temp. Deg. F.
Standard shade	69
Surface of ordinary felt	150
Surface of aluminized felt	119

a clear bright day. The maximum air temperatures which were obtained in the attic on the same day were approximately 113 deg. F., whereas the maximum outdoor air temperature was 10 deg. F. lower. An attic space may be considered as a buffer between the intensely hot roof surface and the living quarters. In certain types of building construction in which the underside of the roof is directly exposed to the occupants, extremely unfavorable conditions are maintained, not only from the resulting high air temperatures in the room, but also from the radiant panel heating effect of the roof surface. Hence in new house construction an attic space should be considered as essential. Furthermore the attic space should be adequately cross ventilated by large louvered openings placed in the ends of the attic space to receive the full benefit of existing winds. The tests made in the Research Residence indicated that natural ventilation of the attic space seemed to be sufficient. The additional heat removal effected by an attic fan which was circulated during the day was not great enough to produce a noticeable difference in the temperatures in the rooms below the attic. It is probable, however, that in extremely small attic spaces or those in which no natural cross ventilation can be obtained that an attic fan or roof ventilator may be found necessary.

Roof temperatures may also be reduced by the use of a water spray on the roof surfaces and by the use of water ponds on the roof. The evaporation of water from the roof tends to reduce the temperature of the roof surface, in some cases much below the prevailing outdoor dry-bulb temperature.

Time Lag in Heat Transmission

The most common method for calculating the cool-
(Continued on page 94)

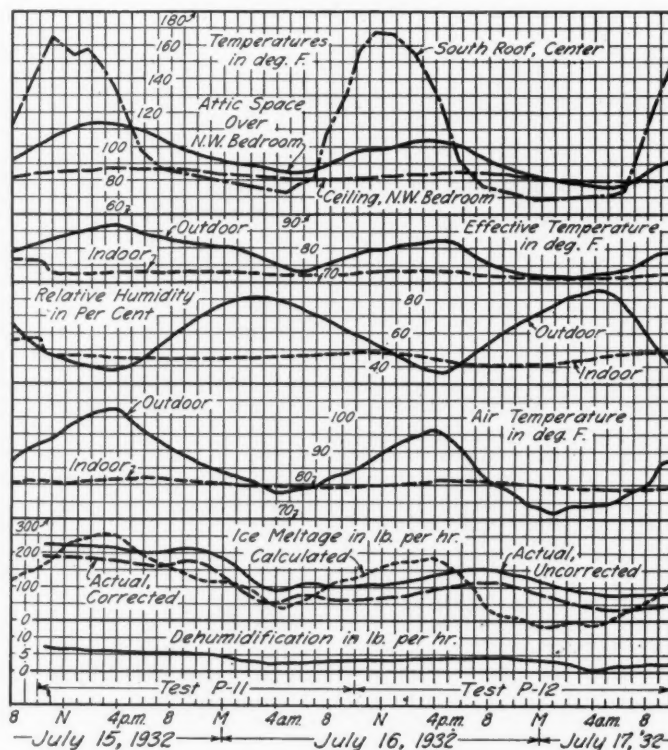


Fig. 4—Temperatures obtained in the Research Residence on a hot day. (U. of I. Eng. Exp. Sta. Bulletin 290)

Precalculated Engineering

By G. A. Voorhees

ALTHOUGH the accompanying tables and those in the last installment, do not include rooms having heat losses beyond 25,000 Btu per hour (25 Mbh), the tables may be applied to larger rooms by breaking down the heat requirement into components of less than 25 Mbh each.

Suppose for example, that a room requires heat delivery of 36,000 Btu per hour (36 Mbh), and further that its register temperature is to be 145 degrees and the duct air velocity is to be 600 fpm.

Since the accompanying Table 47 which applies to a register air temperature of 145 degrees, does not extend up to 36 Mbh, take one-half of this value, 18 Mbh, and then double the corresponding duct area. For 18 Mbh and 600 fpm the table shows the required area to be 57 square inches. Hence, for a room having a loss of 36 Mbh, the duct area would be $2 \times 57 = 114$ square inches.

Btu Limits of One Register

Usually, any room in a dwelling or similar building, with a heat loss of more than 25,000 Btu per hour, would need (in the estimation of most designers) two or more warm air registers. Some very careful installers, for instance, set a limit of 12,000 Btu per hour as the maximum delivery from one register. They argue that a room requiring between 12,000 and 24,000 Btu per hour, needs at least two warm air supply registers to insure adequate *distribution* of the warm air within the room; if its heat requirement is between 24,000 and 36,000 Btu per hour, it needs not less than three supply outlets, etc. Others who formerly felt that 12,000 Btu delivery per outlet was a reasonable limit with the older types of registers, have now advanced their limit to some such higher figure as 15,000 Btu per hour where a proper diffusing type of grille is installed.

The use of two or more supply registers in one room may introduce another problem because of a possible difference in duct lengths which in turn, will result in different register air temperatures. Also, a difference in equivalent lengths of the runs will require different duct velocities to equalize friction.

For example, assume that a room with a heat loss of 30,000 Btu per hour has two warm air runs as follows:

Run No. 1:

Actual length, 16 feet.

Number of 90-degree turns, 2.

Equivalent length for determination of velocity as explained in the last installment and allowing 10 feet

of straight pipe as the equivalent of each 90-degree change in direction, $16 + (2 \times 10) = 36$ feet.

Run No. 2:

Actual length, 28 feet.

Number of 90-degree turns, 5.

Equivalent length, $28 + (5 \times 10) = 78$ feet.

A Low Temperature Problem

Assuming for this problem, a bonnet temperature of 140 degrees, and a temperature drop of 0.5 degrees per foot of *actual* duct length, the corresponding register temperatures will be:

Run No. 1:

$140 - (0.5 \times 16) = 132 = 130$ (to nearest 5 degrees)

Run No. 2:

$140 - (0.5 \times 28) = 126 = 125$ (to nearest 5 degrees)

From the velocity chart (Fig. 2, April issue) the duct velocities corresponding to the equivalent lengths will be:

Run No. 1, having 36 feet equivalent length, 600 fpm.
Run No. 2, having 78 feet equivalent length, 450 fpm.

Since the total heat requirement of the room is 30 Mbh and there are two supply outlets, it is reasonable to assume that each will be called upon to deliver 15 Mbh and the duct areas are determined as follows.

Run No. 1 which has a design register temperature of 130 degrees, is covered by Table 44 in which it is seen that to deliver 15 Mbh at a velocity of 600 fpm within the duct, requires 57 square inches of duct area.

Run No. 2 with a design register temperature of 125 degrees, is covered by Table 43 which shows that the delivery of 15 Mbh at a duct velocity of 450 fpm, requires 82 square inches.

For this problem a low bonnet temperature with correspondingly low register temperatures, has been purposely chosen to emphasize the important fact that low register temperatures require larger ducts for the delivery of a given quantity of heat (if frictional resistance is to be kept down to a reasonable and economical point). Thus, in a system designed for low register temperatures, a greater number of warm air outlets are usually considered necessary because 2-in. x 4-in. studding spaced 16 inches on centers, make it impractical to install a sidewall register head larger than 3½-in. x 14-in. and such a register head has a free area of only 49 square inches.

To a reasonable extent, air velocities in the ducts can be stepped up to compensate for lack of duct area

—but frictional resistance is correspondingly increased. Referring to Table 44 from which Run No. 1 is sized, it is seen that the delivery of the required 15 Mbh through a duct having 49 square inches of area would demand a duct velocity of 700 fpm and since friction pressure loss (commonly called static pressure) varies as the square of the velocity, the increase in static pressure due to stepping up the velocity from 600 fpm to 700 fpm is, expressed decimally:

$$\left(\frac{700}{600}\right)^2 - 1 = 0.36 \text{ or } 36 \text{ per cent}$$

That increase is not enough to condemn the necessary damper adjustment to raise the velocity for Run No. 1, but applying the same method to an investigation of the effect on Run No. 2 we find the increase in pressure loss to be excessive. Thus, Table 43 on

which sizing of Run No. 2 was based, shows that a velocity of 750 fpm would be needed to deliver 15 Mbh through a duct having an area of 49 square inches. Since the original design velocity for this run was 450 fpm, the increase is:

$$\left(\frac{750}{450}\right)^2 - 1 = 1.78 \text{ or } 178 \text{ per cent}$$

In considering this, it is important to remember that the static pressure of the entire job is governed by the static pressure of the run having the greatest pressure loss.

It is because of such a condition that those who design for low register temperatures must necessarily provide a greater number of outlets for a given job, than would be needed if higher design temperatures were chosen.

TABLE No. 45

REGISTER TEMPERATURE—135 DEG.

	Air Velocity										CFM at Reg. Temp.	CFM at 70 Deg.
	350 fpm	400 fpm	450 fpm	500 fpm	550 fpm	600 fpm	650 fpm	700 fpm	750 fpm	800 fpm		
Heat Loss of Room Mbh	Required Area, Square Inches											
4	25	21	19	17	16	14	13	12	11	11	60	53
4.5	28	24	21	19	18	16	15	14	13	12	67	59
5	31	27	24	21	19	18	17	15	14	13	75	66
5.5	34	29	26	24	21	20	18	17	16	15	82	72
6	38	32	29	26	23	21	20	18	17	16	89	79
6.5	41	35	31	28	25	23	21	20	19	17	97	86
7	44	37	33	30	27	25	23	21	20	19	104	92
7.5	47	40	36	32	29	27	25	23	21	20	112	99
8	50	43	38	34	31	29	26	24	23	21	119	105
8.5	53	45	40	36	33	30	28	26	24	23	127	112
9	56	48	43	39	35	32	30	28	26	24	134	118
9.5	59	51	45	41	37	34	31	29	27	25	142	125
10	63	54	48	43	39	36	33	31	29	27	149	132
11	69	59	52	47	43	39	36	34	31	29	164	145
12	75	64	57	51	47	43	40	37	34	32	179	158
13	81	70	62	56	51	46	43	40	37	35	194	171
14	88	75	67	60	54	50	46	43	40	37	209	184
15	94	80	71	64	58	54	50	46	43	40	224	197
16	100	86	76	68	62	57	53	49	46	43	238	211
17	106	91	81	73	66	61	56	52	48	45	253	224
18	113	96	86	77	70	64	59	55	51	48	268	237
19	119	102	90	81	74	68	63	58	54	51	283	250
20	125	107	95	86	78	71	66	61	57	53	298	263
21	131	112	100	90	82	75	69	64	60	56	313	276
22	138	118	105	94	86	79	73	67	63	59	328	290
23	144	123	109	98	89	82	76	70	66	61	343	303
24	150	128	114	103	93	86	79	73	68	64	358	316
25	156	134	119	107	97	89	83	77	71	67	373	329

Tables of Pipe Sizes—350 to 800 FPM; 5 to 25 MBH; By Register Temperature

TABLE No. 46

REGISTER TEMPERATURE—140 DEG.

Heat Loss of Room Mbh	Air Velocity											CFM at Reg. Temp. Deg.
	350 fpm	400 fpm	450 fpm	500 fpm	550 fpm	600 fpm	650 fpm	700 fpm	750 fpm	800 fpm		
4	23	20	18	16	15	13	12	12	11	10	56	49
4.5	26	23	20	18	16	15	14	13	12	11	63	56
5	29	25	22	20	18	17	16	14	13	13	70	62
5.5	32	28	25	22	20	18	17	16	15	14	77	68
6	34	30	27	24	22	20	19	17	16	15	84	74
6.5	37	33	29	26	24	22	20	19	17	16	91	80
7	40	35	31	28	26	23	22	20	19	18	98	86
7.5	43	38	34	30	27	25	23	22	20	19	105	93
8	46	40	36	32	29	27	25	23	21	20	112	99
8.5	49	43	38	34	31	29	26	25	23	21	119	105
9	52	45	40	36	33	30	28	26	24	23	126	111
9.5	55	48	42	38	35	32	29	27	25	24	133	117
10	57	50	45	40	37	34	31	29	27	25	140	124
11	63	55	49	44	40	37	34	32	29	28	154	136
12	69	60	54	48	44	40	37	35	32	30	168	148
13	75	65	58	52	48	44	40	37	35	33	182	161
14	80	70	63	56	51	47	43	40	38	35	196	173
15	86	75	67	60	55	50	46	43	40	38	210	185
16	92	80	72	64	59	54	50	46	43	40	224	198
17	98	86	76	68	62	57	53	49	46	43	238	210
18	103	91	80	72	66	60	56	52	48	45	252	222
19	109	96	85	76	70	64	59	55	51	48	266	235
20	115	101	89	80	73	67	62	58	54	50	280	247
21	121	106	94	84	77	70	65	60	56	53	294	259
22	126	111	98	88	81	74	68	63	59	55	308	272
23	132	116	103	92	84	77	71	66	62	58	322	284
24	138	121	107	96	88	80	74	69	64	60	336	296
25	144	126	112	101	92	84	78	72	67	63	350	309

TABLE No 47

REGISTER TEMPERATURE—145 DEG.

Heat Loss of Room Mbh	Air Velocity											CFM at Reg. Temp. Deg.
	350 fpm	400 fpm	450 fpm	500 fpm	550 fpm	600 fpm	650 fpm	700 fpm	750 fpm	800 fpm		
4	22	19	17	15	14	13	12	11	10	10	53	46
4.5	24	21	19	17	16	14	13	12	11	11	60	52
5	27	24	21	19	17	16	15	14	13	12	66	58
5.5	30	26	23	21	19	18	16	15	14	13	73	64
6	33	29	25	23	21	19	18	16	15	14	79	69
6.5	35	31	28	25	23	21	19	18	17	15	86	75
7	38	33	30	27	24	22	21	19	18	17	92	81
7.5	41	36	32	29	26	24	22	20	19	18	99	87
8	44	38	34	30	28	25	24	22	20	19	106	93
8.5	46	41	36	32	30	27	25	23	22	20	113	98
9	49	43	38	34	31	29	26	25	23	21	119	104
9.5	52	45	40	36	33	30	28	26	24	23	126	111
10	54	48	42	38	35	32	29	27	25	24	132	116
11	59	52	47	42	38	35	32	30	28	26	145	127
12	65	57	51	46	42	38	35	33	30	29	159	139
13	71	62	55	50	45	41	38	35	33	31	172	150
14	76	67	59	53	49	45	41	38	36	33	185	162
15	82	71	64	57	52	48	44	41	38	36	198	174
16	87	76	68	61	56	51	47	44	41	38	211	185
17	92	81	72	65	59	54	50	46	43	40	225	197
18	95	87	76	69	62	57	53	49	46	43	238	208
19	103	90	81	72	66	60	56	52	48	45	251	220
20	109	95	85	76	69	64	59	55	51	48	264	231
21	114	100	89	80	73	67	62	57	53	50	277	243
22	120	105	93	84	76	70	65	60	56	52	291	255
23	125	109	98	88	80	73	68	63	58	55	304	266
24	131	114	102	91	83	76	71	66	61	57	317	278
25	136	119	106	95	87	80	74	68	64	60	331	289

Tables of Pipe Sizes—350 to 800 FPM; 5 to 25 MBH; By Register Temperature

TABLE No. 48

REGISTER TEMPERATURE—150 DEG.

Heat Loss of Room Mbh	Air Velocity										CFM at Reg. Temp. Deg.		
	350 fpm	400 fpm	450 fpm	500 fpm	550 fpm	600 fpm	650 fpm	700 fpm	750 fpm	800 fpm	at 70	CFM	
Required Area, Square Inches													
Room Mbh	21	18	16	14	13	12	11	10	10	9	50	44	
4	21	18	16	14	13	12	11	10	10	9	50	44	
4.5	23	20	18	16	15	14	13	12	11	10	56	49	
5	26	23	20	18	16	15	14	13	12	11	63	54	
5.5	28	25	22	20	18	17	15	14	13	12	69	60	
6	31	27	24	22	20	18	17	16	14	14	75	65	
6.5	34	29	26	23	21	20	18	17	16	15	82	71	
7	36	32	28	25	23	21	20	18	17	16	88	76	
7.5	39	34	30	27	25	23	21	19	18	17	94	82	
8	41	36	32	29	26	24	22	21	19	18	100	87	
8.5	44	38	34	31	28	26	24	22	20	19	107	92	
9	46	41	36	32	30	27	25	23	22	20	113	98	
9.5	49	43	38	34	31	29	27	24	23	21	119	103	
10	52	45	40	36	33	30	28	26	24	23	126	109	
11	57	50	44	40	36	33	31	28	27	25	138	120	
12	62	54	48	43	39	36	33	31	30	27	151	131	
13	67	59	52	47	43	39	36	34	31	29	163	142	
14	72	63	56	51	46	42	39	36	34	32	176	153	
15	77	68	60	54	49	45	42	39	36	34	188	163	
16	83	72	64	58	53	48	45	41	39	36	201	174	
17	88	77	68	61	56	51	47	44	41	38	213	185	
18	93	81	72	65	59	54	50	47	43	41	226	196	
19	93	86	76	69	63	57	53	49	46	43	238	207	
20	103	90	80	72	66	60	56	52	48	45	251	218	
21	108	95	84	76	69	63	59	54	51	47	264	229	
22	114	99	88	79	72	66	61	57	53	50	276	240	
23	119	104	92	83	76	69	64	60	55	52	289	251	
24	124	108	96	87	79	72	67	62	58	54	301	261	
25	129	113	100	90	82	75	70	65	60	57	314	272	

TABLE No. 49

REGISTER TEMPERATURE—155 DEG.

Heat Loss of Room Mbh	Air Velocity										CFM at Reg. Temp. Deg.		
	350 fpm	400 fpm	450 fpm	500 fpm	550 fpm	600 fpm	650 fpm	700 fpm	750 fpm	800 fpm	at 70	CFM	
Required Area, Square Inches													
Room Mbh	20	17	15	14	13	11	11	10	9	9	48	41	
4	20	17	15	14	13	11	11	10	9	9	48	41	
4.5	22	19	17	15	14	13	12	11	10	10	54	46	
5	25	22	19	17	16	14	13	12	11	11	60	51	
5.5	27	24	21	19	17	16	15	14	13	12	66	57	
6	29	26	23	21	19	17	16	15	14	13	72	62	
6.5	32	28	25	22	20	19	17	16	15	14	78	67	
7	34	30	27	24	22	20	19	17	16	15	84	72	
7.5	37	32	29	26	23	22	20	18	17	16	90	77	
8	39	34	31	28	25	23	21	20	18	17	96	82	
8.5	42	37	32	29	27	24	23	21	19	18	102	97	
9	44	39	34	31	28	26	24	22	21	19	108	93	
9.5	47	41	36	33	30	27	25	23	22	20	114	98	
10	49	43	38	34	31	29	27	25	23	22	120	103	
11	54	47	42	38	34	32	29	27	25	24	132	113	
12	59	52	46	41	38	34	32	30	27	26	144	123	
13	64	56	50	45	41	37	34	32	30	28	155	134	
14	69	60	53	48	44	40	37	34	32	30	167	144	
15	74	65	57	52	47	43	40	37	34	32	179	154	
16	79	69	61	55	50	46	42	39	37	34	191	165	
17	83	73	65	58	53	49	45	42	39	37	203	175	
18	88	77	69	62	56	52	48	44	41	39	215	185	
19	93	82	73	65	59	55	50	47	44	41	227	195	
20	98	86	76	69	63	57	53	49	46	43	239	206	
21	103	90	80	72	66	60	56	52	48	45	251	216	
22	108	95	84	76	68	63	58	54	50	47	263	226	
23	113	99	88	79	72	66	61	57	53	49	275	237	
24	118	103	92	83	75	69	64	59	55	52	287	247	
25	123	108	96	86	78	72	66	62	57	54	299	257	

Tables of Pipe Sizes—350 to 800 FPM; 5 to 25 MBH; By Register Temperature

TABLE No. 50

REGISTER TEMPERATURE—160 DEG.

TABLE No. 51

REGISTER TEMPERATURE—165 DEG.

Heat Loss of Room Mbh	Air Velocity										CFM at 70 Reg. Temp. Deg.
	350 fpm	400 fpm	450 fpm	500 fpm	550 fpm	600 fpm	650 fpm	700 fpm	750 fpm	800 fpm	
Required Area, Square Inches											
4	18	16	14	13	11	10	10	9	8	8	44
4.5	20	18	16	14	13	12	11	10	9	9	49
5	23	20	18	16	14	13	12	11	11	10	55
5.5	25	22	19	17	16	14	13	12	12	11	60
6	27	24	21	19	17	16	15	14	13	12	66
6.5	29	26	23	20	19	17	16	15	14	13	71
7	32	28	25	22	20	18	17	16	15	14	76
7.5	34	30	26	24	21	20	18	17	16	15	82
8	36	32	28	25	23	21	19	18	17	16	87
8.5	38	34	30	27	24	22	21	19	18	17	93
9	41	35	32	28	26	24	22	20	19	18	98
9.5	43	37	33	30	27	25	23	21	20	19	104
10	45	39	35	32	29	26	24	23	21	20	109
11	50	43	39	35	31	29	27	25	23	22	120
12	54	47	42	39	34	31	29	27	25	24	131
13	59	51	46	41	37	34	31	29	27	26	142
14	63	55	49	44	40	37	34	32	29	28	153
15	68	59	53	47	43	39	36	34	32	30	164
16	72	63	56	50	46	42	39	36	34	32	175
17	77	67	60	54	49	45	41	38	36	34	186
18	81	71	63	57	51	47	44	41	38	36	197
19	86	75	67	60	54	50	46	43	40	38	207
20	90	79	70	63	57	52	48	45	42	40	218
21	95	83	74	66	60	55	51	47	44	42	229
22	99	87	77	69	63	58	53	50	46	44	240
23	104	91	81	72	66	60	56	52	48	46	251
24	108	95	84	76	69	63	58	54	50	48	262
25	113	99	88	79	72	66	61	56	53	50	273

Heat Loss of Room Mbh	Air Velocity										CFM at 70 Reg. Temp. Deg.
	350 fpm	400 fpm	450 fpm	500 fpm	550 fpm	600 fpm	650 fpm	700 fpm	750 fpm	800 fpm	
Required Area, Square Inches											
4	19	16	15	13	12	11	10	9	9	8	46
4.5	21	19	16	15	13	12	11	11	10	9	51
5	24	21	18	16	15	14	13	12	11	10	57
5.5	26	23	20	18	16	15	14	13	12	11	63
6	28	25	22	20	18	16	15	14	13	12	68
6.5	31	27	24	21	19	18	17	15	14	13	74
7	33	29	26	23	21	19	18	16	15	14	80
7.5	35	31	27	25	22	21	19	18	16	15	86
8	38	33	29	26	24	22	20	19	18	16	91
8.5	40	35	31	28	25	23	22	20	19	18	97
9	42	37	33	30	27	25	23	21	20	19	103
9.5	45	39	35	31	28	26	24	22	21	20	108
10	47	41	37	33	30	27	25	24	22	21	114
11	52	45	40	36	33	30	28	26	24	23	125
12	56	49	44	39	36	33	30	28	26	25	137
13	61	53	48	43	39	36	33	31	28	27	148
14	66	58	51	46	42	38	36	33	31	29	160
15	71	62	55	49	45	41	38	35	33	31	171
16	75	66	59	53	48	44	41	38	35	33	182
17	80	70	62	56	51	47	43	40	37	35	194
18	85	74	66	59	54	49	46	42	39	37	205
19	89	78	70	63	57	52	48	45	42	39	217
20	94	82	73	66	60	55	51	47	44	41	228
21	99	86	77	69	63	58	53	49	46	43	239
22	103	90	81	72	66	60	56	52	48	45	251
23	108	95	84	76	69	63	58	54	50	47	262
24	113	99	88	79	72	66	61	56	53	49	274
25	118	103	92	82	75	69	64	59	55	52	285

Pattern Development for

Air Conditioning Fittings*

By William Neubecker

Head Instructor

Sheet Metal Department, New York Trade School

A CORRESPONDENT from Minnesota, sends in two sketches of stack boots. He requests that the layout be made in two pieces with collar on center. The center boot sketch has been reproduced in Fig. G in the accompanying illustration and the angular boot in Fig. J. He also desires the boot in Fig. G to be laid out off center, with a straight side, so it can be used reversible for right or left.

Assuming that the stacks in both boots are to be 8 in. \times 3½ in. having an area of 28 sq. inches, the diameter of the feed duct or round inlet can be quickly obtained by referring to a Table of Areas and Circumferences. Follow the column of Areas to 28.2744, then look to the left to the Diameter column and find 6 in. which will be the desired diameter. In Fig. G the side and front elevations including the plan and section have been carefully drawn showing the projection points to the right and below the side elevation. In laying out the pattern for this fitting, a simplified method of triangulation will be used which is *geometrically accurate* and does not need a plan or front view.

All that is required is a side elevation with a *half* section of the rectangular riser and a *half* section of the circular inlet as shown in the side elevation in Fig. H.

It should be distinctly understood that this simplified method can only be used when both sides of the fitting are symmetrical. In other words when both sides of the fitting on either side of the line X-Y in plan in Fig. G are similar.

When the fitting is off center and the two halves are not alike, then and only then need a plan be used as will be explained in the off center problem later on.

Developing By Simplified Method

Referring to Fig. H let A-B-7-1 be the side elevation of a center fitting drawn to its proper dimensions. Above the line A-B place the *one half section of the rectangular stack* as shown by A-A, B-B. On the line 1-7 place the *semi-circle*, and divide into equal divisions as shown from 1 to 4 to 7, from which points draw lines at right angles to 1-7 to intersect 1-7 from 2° to 6°. From the divisions 1-2°-3° and 4° draw lines to the apex A and from the division 4° to 7 draw lines to the apex B. These lines will then represent the bases of sections to be constructed whose altitudes are equal to the various heights shown in the *half rectangular section and semi-circle* in elevation.

For example, to find the true lengths of the lines shown in F in side elevation, proceed as follows: Set off the lengths of the lines B-7, B-6°, 5° and 4° on

any horizontal line in the true lengths in F as shown by B-7, B-6°, 5° and 4°. From the intersecting B, 6°, 5° and 4° erect perpendicular lines equal respectively to B-B in the *half section of rectangle* and 6°-6, 5°-5 and 4°-4 in the *semi-circle* in side elevation, thus obtaining the altitudes B-B°, 6°-6, 5°-5 and 4°-4 in the true lengths in F.

Draw lines from B° to 7, B° to 6, to 5 and 4, representing the true lengths of similar numbered lines in F in side elevation. In precisely the same manner obtain the true lengths of the lines in E in side elevation as shown in the diagram of true lengths in E.

Having found all of the true lengths, the pattern can now be developed. Below the elevation draw any vertical line as B-7, equal in length to B-7 in elevation. At right angles to B-7 in the pattern, draw the line B-B° equal to B-B in the *half section*. Draw a line from B° to 7 in the pattern which should equal B°7 in the true lengths in F. Now with radii equal to B°6, B°5 and B°4 in the true lengths in F and using B° in the pattern as center describe short arcs near 6, 5 and 4. Set the dividers equal to the divisions 7-6, 6-5 and 5-4 in the *semi-circle* and starting from 7 in the pattern step to arc 6, 5, and 4. Draw a line from 4 to B°.

Now with B-A in the side elevation as radius and B° in the pattern as center, describe a short arc near A° and intersect it by an arc struck from 4 as center with 4-A° in the true lengths in E as radius. Draw lines in the pattern from B° to A° to 4. Now with radii equal to A°-3, A°-2 and A°-1 in the true lengths in E and using A° in the pattern as center draw short arcs near 3, 2 and 1. Again set the dividers equal to the divisions between 4 and 1 in the *semi-circle*, and starting from 4 in the pattern step to arcs 3, 2 and 1. Draw a line from 1 to A°.

Now with 1-A in the side elevation as radius and 1 in the pattern as center, draw a short arc near A and intersect it by an arc struck from A° as center with a radius equal to A-A in the *half section*. Draw lines from 1 to A to A° and trace the curved line from 1 to 4 to 7. B-B°-A°-A-1-7-B is then the one half net pattern shape for the center boot shown in Fig. G. Collars must be added and laps and edges allowed for locks and seaming. The heavy dots on solid lines shown on the pattern shape indicate where *slight bends* should be made, bending inward as indicated by the section lines a, b, c and d.

Angular Boot with Sides Symmetrical

In Fig. J is shown a front, side and plan view of an angular boot, both sides of which are symmetrical, and therefore, can be developed by the simplified method.

*All rights reserved.

PATTERNS FOR CENTER AND ANGULAR BOOTS USING THE SIMPLIFIED METHOD IN TRIANGULATION

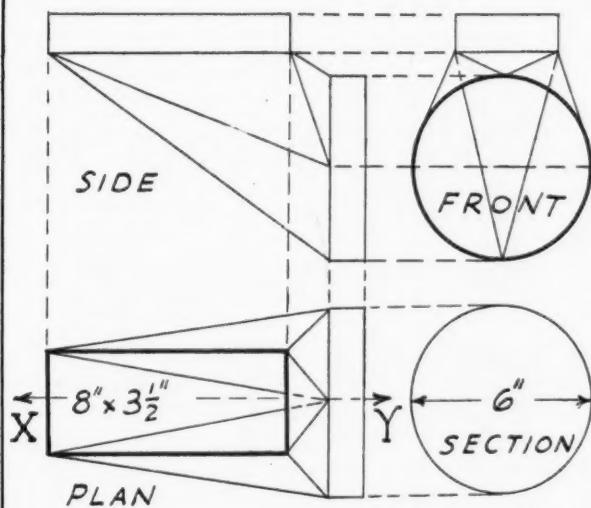


FIG. G. CENTER BOOT

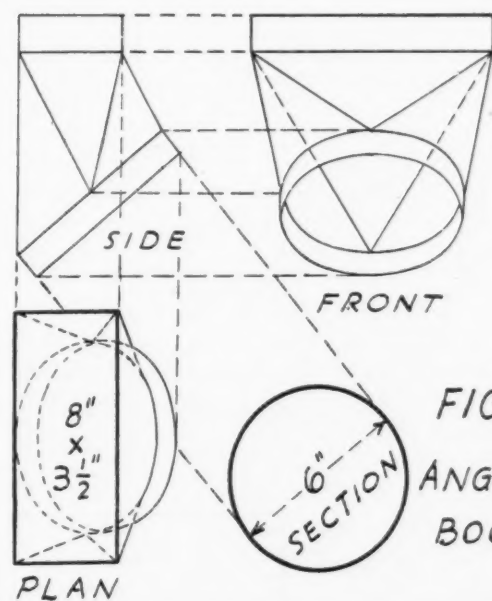
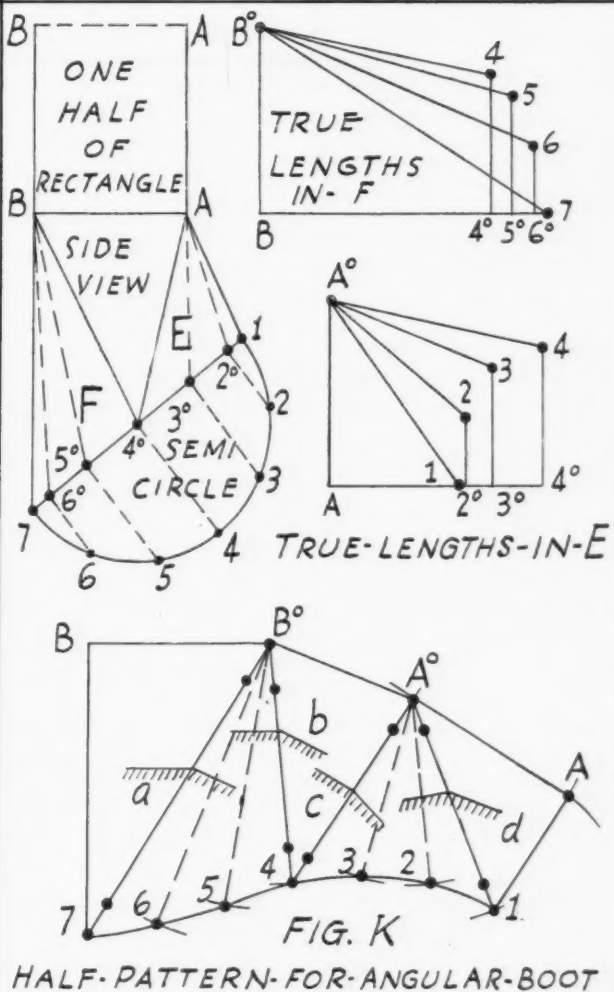
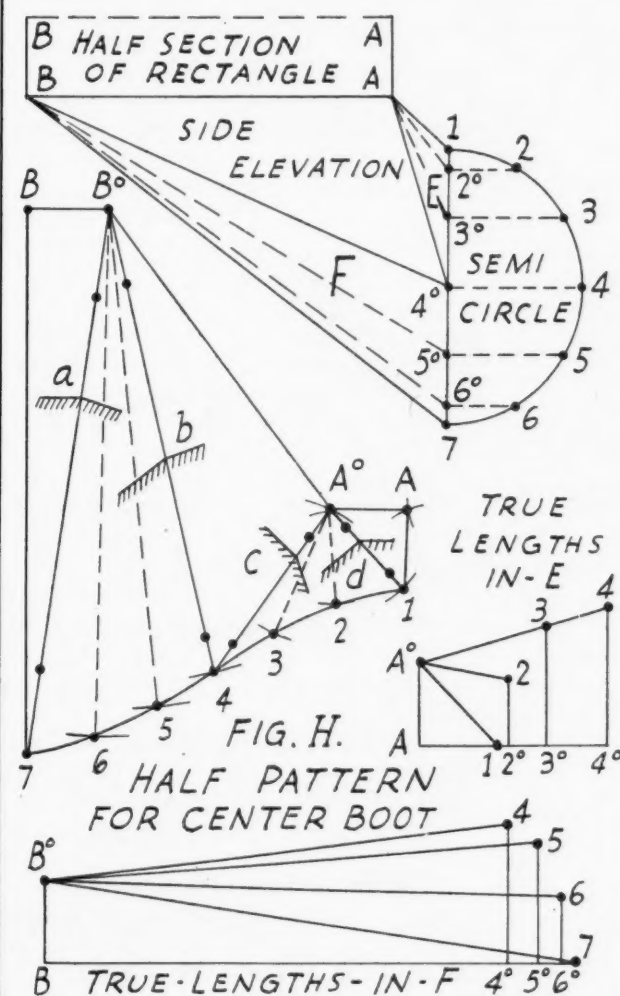
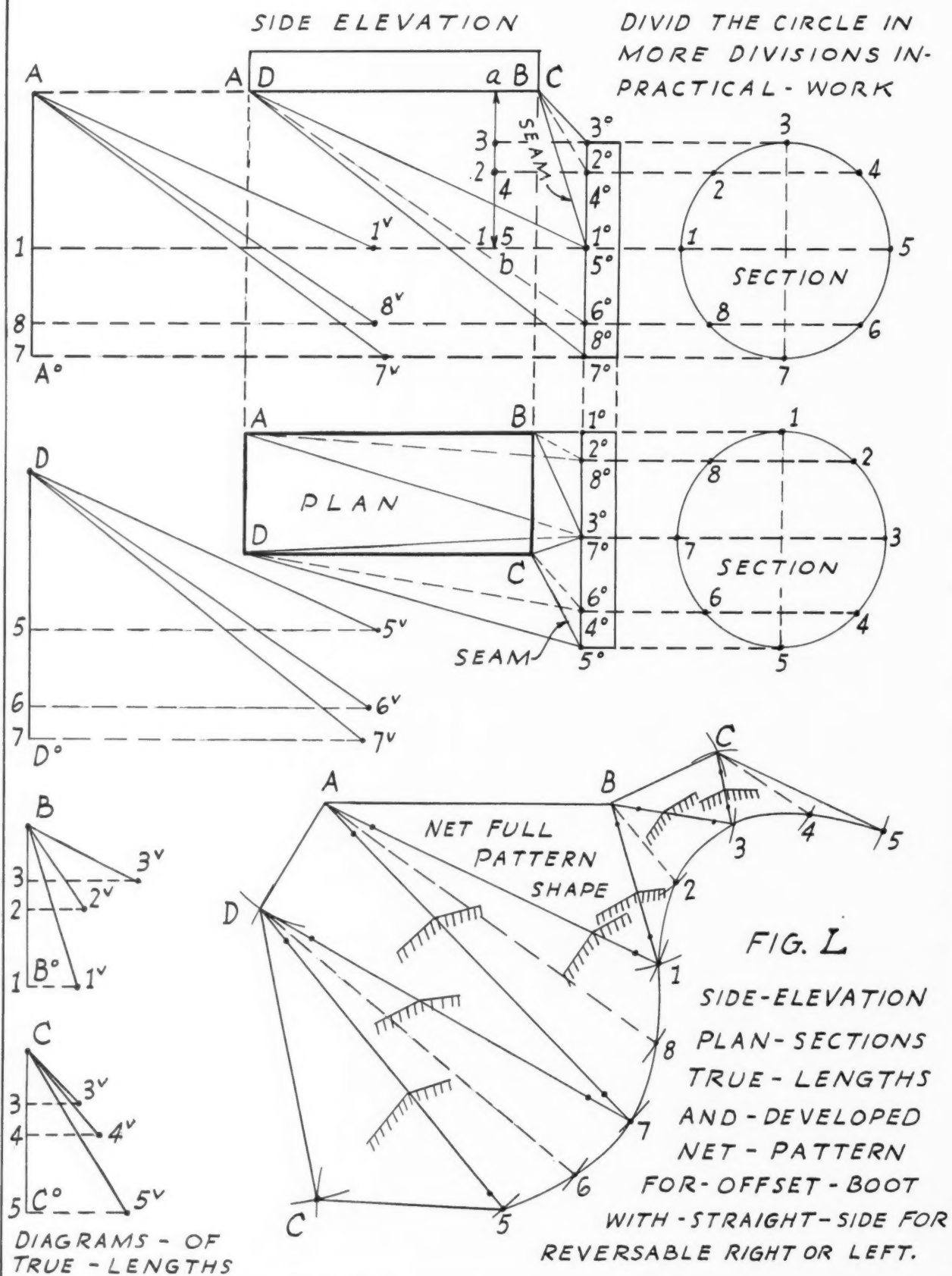


FIG. J.
ANGULAR
BOOT



PATTERN FOR OFFSET BOOT WITH STRAIGHT SIDE
FOR REVERSABLE RIGHT OR LEFT



In this problem the rectangular stack is placed in an opposite position from that shown in Fig. G. As in the previous problem, no plan or front views are required. All that is necessary is the side view as shown below in Fig. K. Note the position of the *semi-circle* on the angle inlet and the position of the *one-half section of the rectangle* at the outlet. Also note carefully that the side view, the true lengths and the half pattern shape have the same letters and numerals as shown on the side elevation, the true lengths and the half pattern shape in Fig. H.

This has been done so that the text given in connection with Fig. H is also applicable to Fig. K. Care should be taken when reading the text to always bear in mind whether the text is being applied to Fig. H or to Fig. K, because the letters and numerals are similar in both developments.

Pattern for Boot Off-Center with a Straight Side

When the boot is to be developed off center with one side straight, so that it can be reversed for right and left use, then the simplified method *cannot* be used because both halves are not symmetrical and a plan must be used in developing the offset pattern which is explained in detail in the second illustration marked Fig. L. First draw the side elevation to its proper dimensions and angle as shown by $AD-BC-3^\circ-7^\circ$ and to the right of $3^\circ-7^\circ$ draw the circle shown which divide in equal divisions as shown by the small figures 1 to 8 from which points horizontal lines are drawn to the left to intersect the vertical line $3^\circ-7^\circ$ in elevation from 1° to 8° as shown. From the intersections 3° , $2^\circ-4^\circ$, and $1^\circ-5^\circ$ draw lines to the corner BC and from the intersections $1^\circ-5^\circ$, $6^\circ-8^\circ$ and 7° draw lines to the corner AD .

Now in its relative position below the elevation draw the plan view with a straight side as indicated by the line $A-B-1^\circ$. Complete the plan of the riser stack as shown by $A-B-C-D$ and from 1° draw the vertical line $1^\circ-5^\circ$ equal to the diameter of the round duct.

To the right of $1^\circ-5^\circ$ draw the circle of the same diameter as that shown to the right of elevation and space it with a similar number of divisions as shown from 1 to 8, being careful when numbering the points to make a quarter turn. In other words, if the points 1-5 in the circle in elevation lie on a horizontal plane, then will 1-5 in the circle in plan lie on a vertical plane all as shown.

From these small figures 1 to 8 in section in plan draw horizontal lines to the left to intersect the line $1^\circ-5^\circ$ in plan as shown by similar numbers. From the intersection 1° , $2^\circ-8^\circ$ and $3^\circ-7^\circ$ draw lines to the corners A and B and from the intersections $3^\circ-7^\circ$, $4^\circ-6^\circ$ and 5° draw lines to the corners C and D . These lines will then represent the bases of triangles to be constructed whose altitudes are equal to the vertical heights of similar numbers and letter in elevation and whose true lengths are found as follows:

From the various intersections $1^\circ-8^\circ$ and 7° in the side elevation draw horizontal lines to intersect the vertical line $A-A^\circ$ at the left at 1, 8 and 7. Now take the distance of the lines in plan from A to 7° , 8° and 1° and set them off on similar numbered lines to the left of the side elevation as shown from 7 to 7^v , 8 to 8^v

and 1 to 1^v , from which points draw lines to the apex A . Then will $A-7^v$, $A-8^v$ and $A-1^v$ be the true lengths of similar numbered lines shown in either plan or elevation. As the line $A-1^\circ$ in plan lies on a horizontal plane then will the line $A-1^\circ$ in elevation show its true length and will be similar to $A-1^v$ in the true lengths.

To avoid a confusion of lines take the various heights of A , 1, 8 and $7-A^\circ$ in the true lengths and set them off below, as shown by D , 5, 6 and $7-D^\circ$ (both numbers having similar heights as shown in side elevation.) At right angles to $D-D^\circ$ from points 5, 6 and 7 draw horizontal lines as shown, making $5-5^v$, $6-6^v$ and $7-7^v$ equal respectively to the lengths in plan from D to 5° , 6° and 7° . Draw lines in the true lengths from 5^v-6^v and 7^v to D which will be the true lengths of similar numbered lines in either plan or elevation.

In elevation draw any vertical line as $a-b$ on which project the vertical heights 3, 2-4 and 1-5 as shown. Take these heights $a-3-2-1$ and set them off in the true lengths on the line $B-B^\circ$ as shown from B to 3 to 2 to 1 from which points draw horizontal lines and make $3-3^v$, $2-2^v$ and $1-1^v$ equal to the distances measured in plan from B to 3° to 2° to 1° respectively. Draw lines in the true lengths from 1^v , 2^v and 3^v to the apex B which will be the true lengths of similar numbered lines in plan or elevation. As $B-1^\circ$ in plan lies on a horizontal plane, then will $B-1^\circ$ in elevation show its true length and will be similar to $B-1^v$ in the true lengths.

In a similar manner take the heights from a to 3 to 4 to 5 in elevation and set them off on the vertical line $C-C^\circ$ in the true lengths as shown from C to 3 to 4 to 5. From these points draw horizontal lines and make $3-3^v$, $4-4^v$ and $5-5^v$ equal respectively to the distances measured in the plan from C to 3° to 4° to 5° . Draw lines in the true lengths from 3^v , 4^v and 5^v to the apex C , which will be the true lengths of similar numbered lines in either plan or elevation. It will be noted that all the true lengths have been placed separately so as to avoid confusion if they were placed together in so small a drawing.

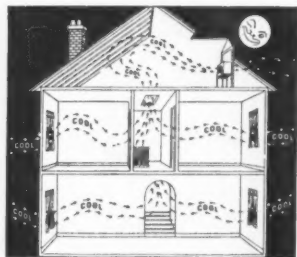
In practical work *all of the true lengths* could be found in the space to the left of the elevation by projecting horizontal lines to the left from *all the numbers shown in elevation*. Having found all the true lengths, the pattern is now in order. Take the distance $A-B$ in plan and set it off as shown by $A-B$ in the pattern. With $B-1^\circ$ in elevation or $B-1^v$ in the true length (both being similar) as radius and with B in the pattern as center draw a short arc near 1 and intersect it by an arc struck from A as center with a radius equal to $A-1^\circ$ in elevation or $A-1^v$ in the true lengths (both being similar).

Now with radii equal to $A-8^v$ and $A-7^v$ in the true lengths, and with A in the pattern as center, draw short arcs near 8 and 7. Set the dividers equal to the divisions 1 to 8 to 7 in either section and starting from 1 in the pattern step to arc 8 and 7 and draw lines from 7 to A to 1 to B . With $A-D$ in plan as radius and A in the pattern as center, draw a short arc near D and intersect it by an arc struck from 7 as center with a radius equal to 7^v-D in the true lengths. Draw a line from 7 to D . With radii equal to $D-6^v$ and 5^v in the true lengths and D in the pattern as center, draw short arcs near 6 and 5.

(Continued on page 104)

Comfort FOR SALE

Here's how to COOL the whole house!



Attic System of Home Ventilation

Attic Ventilation removes the hot air from your home—and brings in cool, fresh air! It does this so simply and economically that you certainly will want Attic Ventilation installed in your home before hot days arrive. Investigate it NOW!

Better Living THROUGH THE WIDER USE OF Cheaper Electricity

This system of ventilation removes the hot, stagnant air from your sun-baked attic and creates a positive circulation of fresh air all over the house! Nothing complicated to cause trouble or expense. See your dealer for full information.

Today's lower electric rates permit operation of Attic Ventilation and other electrical appliances at lower cost than ever before!

ARKANSAS POWER AND LIGHT COMPANY
Helping Build Arkansas
HARVEY COUCH, PRESIDENT FRANK M. WILKES, GENERAL MANAGER

BUY APPLIANCES FROM YOUR LOCAL DEALER
NIGHT AIR COOLING by ATTIC VENTILATION

Attic Ventilation removes the hot air from your home—and brings in cool, fresh air! It does this so simply and economically that you certainly will want Attic Ventilation installed in your home before hot nights arrive. Investigate this system without delay!

Better Living THROUGH THE WIDER USE OF Cheaper Electricity

This system of ventilation removes the hot, stagnant air from your sun-baked attic and creates a positive circulation of fresh air all over the house! Nothing complicated to cause trouble or expense. See your dealer for full information on Attic Ventilation!

Today's lower electric rates permit operation of Attic Ventilation and other electrical appliances at lower cost than ever before!

ARKANSAS POWER AND LIGHT COMPANY
Helping Build Arkansas
HARVEY COUCH, PRESIDENT FRANK M. WILKES, GENERAL MANAGER

BUY APPLIANCES FROM YOUR LOCAL DEALER

YOU CAN BE COOL ALL SUMMER LONG

Cool Days! Cool Nights!



ASK US ALL ABOUT

Attic Ventilation



This simple, easily-installed system of Home Ventilation removes the hot, stagnant air from the attic and creates a positive circulation of fresh air all over the house!

Enjoy cool comfort throughout the house day and night. Sleep in a cool room—wake refreshed instead of bedagleged! See this equipment at your dealers or at our display room.

Installed on small down payment; balance on easy monthly terms!

ARKANSAS POWER & LIGHT CO.
Helping Build Arkansas



BUY APPLIANCES FROM YOUR LOCAL DEALER

An Inventory of Attic Ventilation in Arkansas

By Walter Scott
Pine Bluff, Ark.

lation promotion with a vigor that could have been born only of a vision that its possibilities offered. Even the manufacture of attic ventilation systems by Arkansas concerns has been launched.

Launched at Sales Meeting

Much of the success of last year's campaign can be credited to the thoroughness with which the subject of attic ventilation was handled at the annual sales meeting of the power company in January, 1938. Following this emphatic presentation of the joint sales program to its own employees, the power company took the new plan direct to the dealers in a series of meetings held throughout the territory served.

Briefly, here is what the power company offered to do:

1—Lend its sales experience and force of supervisors to dealers to conduct schools of instruction in salesmanship, sales campaigns, and other aggressive movements.

2—Co-operate in advertising campaigns by taking large central advertisements stressing only the comforts, conveniences and economies of attic ventilation, urging home owners to "Buy Appliances from Your Local Dealer." This enabled the dealers to concentrate their own advertisements on their particular systems, and prices.

3—Assist in a direct-by-mail campaign, furnishing a select list of electric customers, addressing and mailing circulars, charging only for the postage.

4—Use its appliance survey and other sources of information to furnish dealers with tips of prospective customers.

5—Stress attic ventilation in "Geared Sales," the monthly publication of the Sales Promotion Division of the Sales Department in educating dealers to the possibilities of profit offered by promoting attic ventilation.

THROUGH an intensive and varied promotion program in which dealers have reaped very satisfactory dividends, the Arkansas Power and Light Company has made every one of the 56 counties in which it operates very muchly "attic ventilation conscious."

During 1938, dealers in the territory served by the Arkansas Power and Light Company sold 500 home ventilating systems, 15 exhaust fans and seven attic fans, according to J. F. Tuohey, commercial sales manager.

"Because the sale of attic ventilating systems the year before was so small, it is hardly possible to estimate exactly how great the increase really was last year," Mr. Tuohey says. "And this year the prospects are bright for greatly increasing last year's results."

It was not until the Arkansas Power and Light Company radically revised its sales policy in 1938, virtually going out of the appliance business and throwing its support to dealers in a wide-spread program of co-operative effort, that attic ventilation really hit its stride in Arkansas.

The results have been most satisfactory, Mr. Tuohey reports. Dealers have taken up attic venti-

6—Supply dealers with materials and ideas for attic ventilation sales programs.

Plan Well Received

At each of the dealer meetings where these aids were pledged there were some who could not believe that the power company would go to this extent to promote this new convenience but dealers all agreed that if the utility WOULD do this, they could break all kinds of records. Time showed that the power company meant what it had promised, and it was not long before dealers put attic ventilating systems in show windows, mounted them on trucks and went about from home to home demonstrating them. They joined in the co-operative advertising program, resulting in added co-operation on the part of newspapers. The idea of attic ventilation was sold to the public in short order.

Sales Promotion Division Pushed

Although it brought greatly increased work for the Sales Promotion Division, Alfred Givens, Jr., the director, met the challenge. "Geared Sales" began putting attic ventilation in the foreground in each issue. One edition contained a two-page layout on hotels that had installed attic ventilation. Another contained a lengthy and well illustrated article on an Arkansas firm that manufactures attic ventilation systems.

Having just recently completed the compiling and publishing of a survey of each of the 70,000 customers of the Arkansas Power and Light Company—made from a house to house canvass—Director Givens was able to put into the hands of each dealer a booklet showing just what electrical appliances each customer had, how old it was, etc.

With this list of customers the power company was able to mail out advertising matter supplied by the dealers to persons who received electric service, thus eliminating all waste in a direct-by-mail campaign.

Newspaper Tie-Ins Effective

Meanwhile Al G. Whidden, advertising manager of the power company, was putting his co-operative advertising plan into effect. A series of advertisements stressing attic ventilation in general was arranged and the mats sent to newspapers far in advance of publication date. Proofs of the advertisements were sent to dealers, who were advised to get in touch with their newspapers and urged to co-operate by arranging to publish their own attic ventilation ads at the same time that the power company's appeared. Through this arrangement it was possible for the newspapers to arrange special layouts on attic ventilation that included news type articles and pictures that added to the promotional value of the campaign.

Special articles on attic ventilation prepared by the utility advertising department were supplied the

Above—Two pages from "Geared Sales," dealer monthly house organ, showing typical stories of the attic ventilation campaign. On facing page—Typical newspaper advertisements in which the power company and the dealers jointly buy space

HANDBOOK OF HOME COMFORTING

Sales Department



The "Handbook of Home Comforting" is a 27-page mimeographed treatise, replete with drawings, covering all angles of the sale, engineering, installation of attic ventilation systems. Typical pages give an idea of the contents.

newspapers to go along with the layouts. In all of its advertising, and in the special articles, the power company stressed only the comforts, conveniences and economies of such systems. Presentation of features of particular makes, as well as prices, was left to the dealers.

Distinction Stressed

One of the most fruitful results of the campaign has been the acquainting of the public with the distinction and difference between attic ventilation and air conditioning. When attic ventilation first was introduced in the power company's territory some complaints were heard that attic ventilation did not chill the home cooler than the temperature outside the house.

The power company began to stress the fact that "attic ventilation is not a refrigeration system which will lower the temperature in a house below that outside." The customer was not led to believe that attic ventilation would do the impossible.

This frankness has not destroyed any of the selling merit of attic ventilation, but has increased public confidence in the sales talk for the system and has been of great help in putting the program across.

Helps to Dealers

The Sales Promotion Division has issued two booklets about its sales plans that have been of

WHY ATTIC VENTILATION

Almost all buildings, whether they are homes or public buildings, have an attic space of some kind. The attic is usually a dead air space between the roof and the ceiling of the room directly below the roof. This attic is the main source of objectionable heat during the summer.

As the direct rays of the sun beat down on the roof all day this dead air space stores up heat. It becomes a storehouse of enormous capacity that absorbs the heat from the intense summer sun's rays.

The undesirable experience of entering a still, hot attic space, when heated, becomes an even more undesirable experience when the heat is so close to the head.

PART 2 APPLYING ATTIC VENTILATION

DETERMINING THE FAN

The whole problem of attic ventilation is based on the movement of volumes of air. The fans we use to move this air are rated in cubic feet per minute capacity.

This naturally leads us to the fact that the volume of the building to be ventilated must be selected to select the proper fan for the volume.

It is of importance to select the proper fan for the volume.

PART 3 COMFORT COOLING FOR COMMERCIAL ESTABLISHMENTS

Stores, beauty shops, restaurants, small theatres and similar places that cannot afford complete air conditioning can be made more comfortable during the summer time by means of ventilation equipment.

When you are warm, your skin is moist. Blow a little hot air on that moisture and it feels cool, because that air has quickened the evaporation and your skin reduces its own effective temperature. Put a little more ether or benzol in your hand. It will feel cool because ether and benzol evaporate quickly and this quickens evaporation causing the cooled sensation. That's how Mother Nature cools us off when we ride in our automobiles. The air may be still and hot and your body moist with perspiration. Yet without the temperature of the air because of motion, you feel cool. This is Mother Nature's cooling system.

assistance to dealers in this particular field. One is "Dollars to Dealers," in which the co-operative sales program of the utility is explained in full.

The other is "A Handbook for Home Comforting." This booklet provides the attic ventilation dealer, who does not have the services of an engineer, with information he can understand and utilize in figuring out the attic ventilation requirements of homes, stores, and other buildings.

It is illustrated, contains engineering charts that are easily understood, and has been most helpful to dealers.

New Campaign Under Way

The 1939 campaign is well under way now. Direct by mail programs have been started, newspaper advertising is planned, and other features of the year's activities are well established.

"Geared Sales" has resumed its featuring of this system of home cooling, and plans are well under way for the supervisory sales force of the power company to lend even greater assistance to dealers than was given last year.

Paul Denson, dealer co-ordinator of the power company, Commercial Sales Manager J. F. Tuohey, and others in the Sales Department are confident that 1939 will find Arkansas far advanced in the field of attic ventilation, despite its late start.

P. C. Tucker, general sales manager of the power company, points out that "the almost unendurable heat of Arkansas summers makes every person in

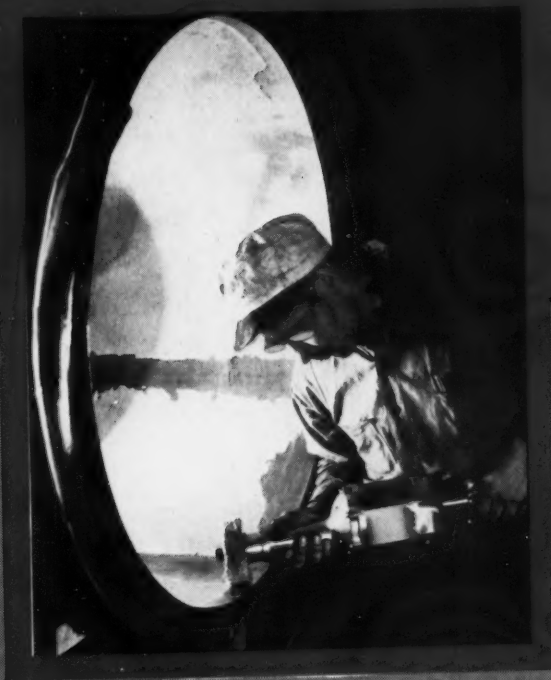
(Continued on page 106)

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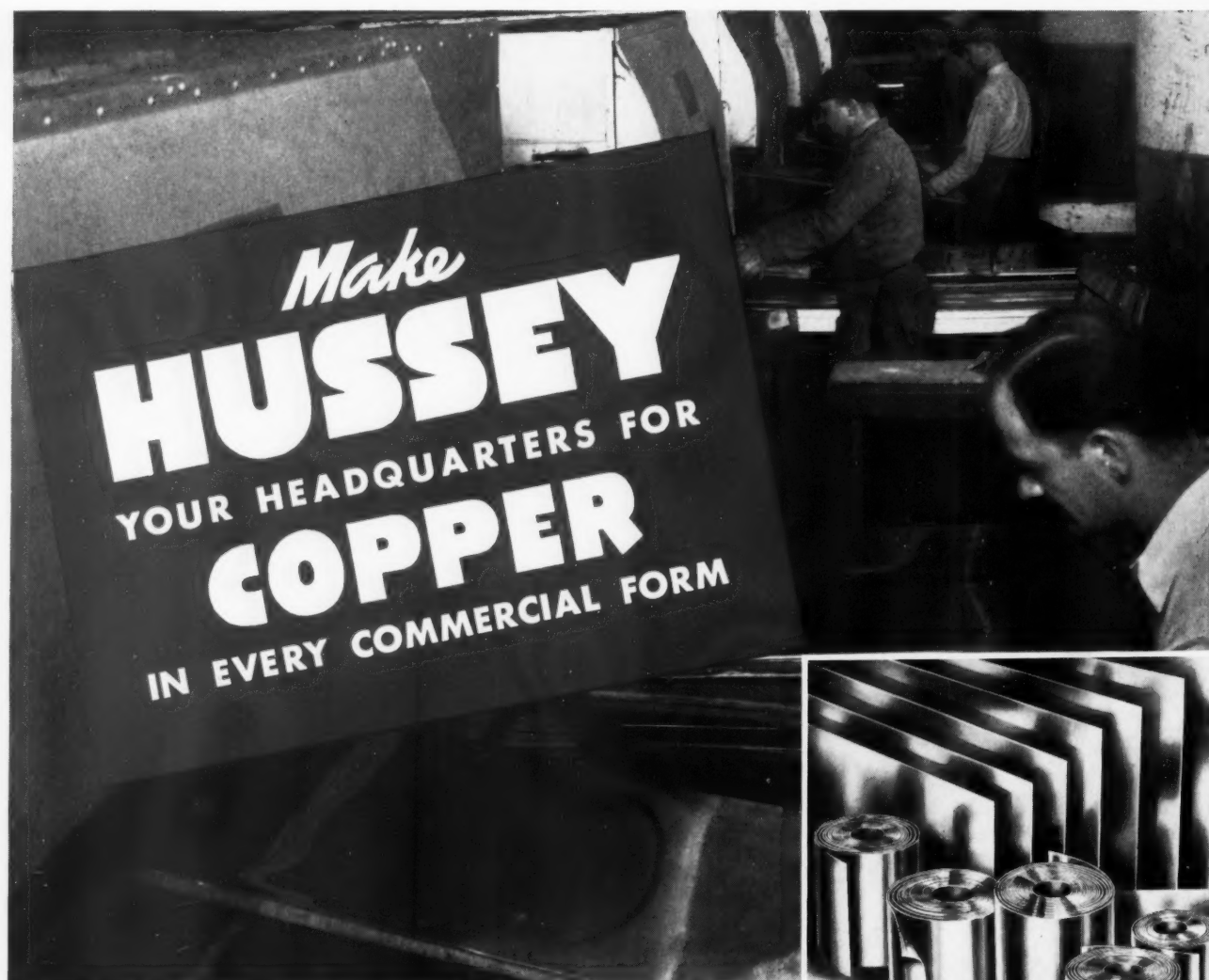
AMERICAN ARTISAN

SHEET METAL

SECTION



DEVOTED TO SHEET METAL CONTRACTING AND FABRICATING



Because of Hussey's complete product control from mine to warehouse, you will find it both economical and convenient to centralize your copper requirements with Hussey.

A nationwide sales and service organization plus conveniently located, well stocked company warehouses in large industrial centers, are your constant assurance of controlled quality, low cost and undivided responsibility in *Hussey Copper*—an outstanding name for more than 90 years!

C. G. HUSSEY & COMPANY

Division of Copper Range Co.

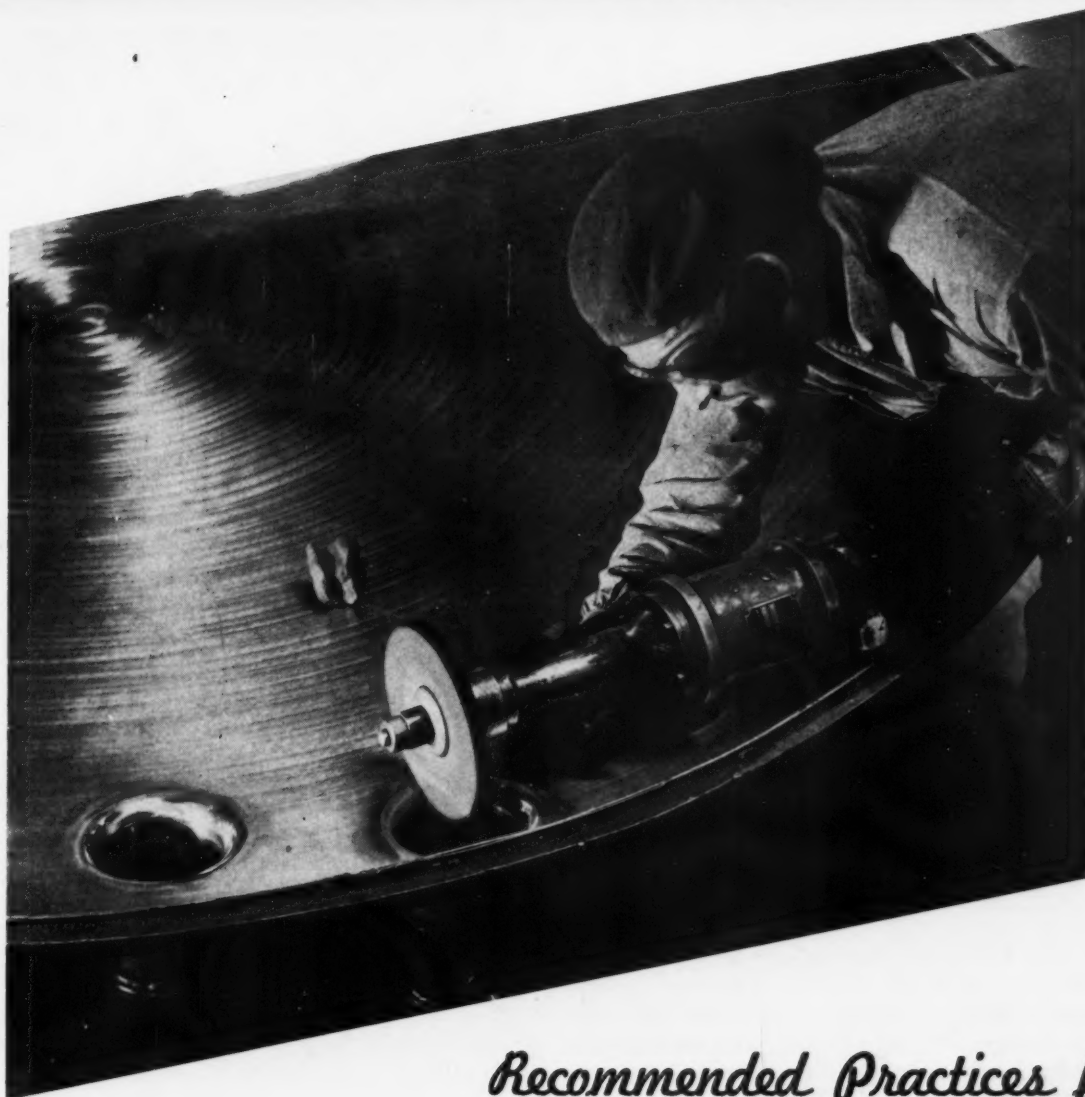
Folling Mills and General Offices: PITTSBURGH, PA.



SHEETS STRIPS
ROLLS ROD
TUBING
NAILS AND RIVETS
PREFABRICATED
ROOFING MATERIALS

All Hussey
Warehouses now
carry stocks of
Copper—Armored
BISALKRAFT
1-2-3 oz.
Weights

Copper **HUSSEY** *Brass*



Recommended Practices for Grinding, Polishing, Buffing Stainless Steel*

THE grinding, polishing and buffing of stainless steels must be considered differently from other steels and non-ferrous metals. Because stainless steels are tougher than other steels, they tend to drag and wear out wheels more rapidly. They conduct heat away more slowly than other steels and non-ferrous metals and, therefore, are easier to overheat and warp. Table 1 on the next page will serve as a guide for the proper polishing cycle to produce a mirror finish from a welded condition, which are the two extremes of finish, as well as the proper procedure to produce commercial or special finishes on sheet and strip products.

Operation No. 1 is used when considerable metal is to be removed, such as grinding a weld flush or matching a welded area with the general surface of the product. The weld should stand out in relief over and above the remaining surface. In no case should any grinding be started if the area next to the weld is concave as excessive grinding will be

required and the finished job will be too thin in these places. Flexible shafts or portable tools are very satisfactory for operation No. 1. The shape and size of the wheels, of course, depend on the contour of the area to be ground. A No. 36 or No. 60 grit wheel will cut fast enough for this operation, as a rubber bonded or bakelite bonded wheel is free cutting and does not load or glaze. This operation should continue until the ground area appears to widen out, indicating the level of the parent metal is reached. A length of 12 to 18 inches should be ground at one time, moving the machine over the surface fast enough to keep from overheating.

Operation No. 2 follows No. 1 in preparing a welded area to a No. 4 finish, or it can be used as an initial operation in producing a No. 4 finish from heavy gauge sheets or plates. This operation should continue until all of the heavy grit lines are eliminated when following operation No. 1, or in the case of grinding heavy gauge sheets or plates, should continue until all surface imperfections are removed.

Operation No. 3 follows No. 2 in any case and can be used as an initial operation for light gauge sheets.

*Condensed from the booklet "The Fabrication of Republic Enduro Stainless Steel," shortly to be issued by Republic Steel Corporation, Cleveland Ohio. All photographs from the same booklet.

Grease stick or oil is used in this operation to lubricate the wheel and bring up the color. This operation should continue until all the grit lines are removed from operation No. 2, or in the case of polishing light gauge sheets, until a uniform polish is obtained.

Operation No. 4 is a relatively short operation, used only long enough to develop a uniform finish such as the standard accepted No. 4 finish.

Note: Since the greatest percentage of polished stainless is used in No. 4 finish, the above cycle should suffice. However, since practically all of the polishing wheels and equipment used by fabricators are not wide enough to cover the entire area of the finished product, grease streaks or highlights will show up after operation No. 4. The entire area can then be blended into a uniform No. 4 finish, by using 150 or 180 abrasive cloth, soaked in oil, on a hand block and lightly rubbing the entire surface.

Operation No. 5 follows No. 4 when a No. 7 or high lustre finish is desired. The operation should continue long enough to remove any heavy grit lines from operation No. 4 which are not perceptible in the No. 4 finish but show up in the buffing operation necessary to make a No. 7 or high lustre finish.

Operation No. 6 should continue long enough to remove **ALL** grit lines and develop considerable reflectivity.

Operation No. 7 should continue long enough to bring up a mirror finish.

Operation No. 8 is a relatively short operation after No. 7 necessary only to bring out the ultimate color and reflectivity.

Operation No. 9 is used after operation No. 4 in order to develop a No. 6 or Tampico finish.

Operation No. 10 is used after operation No. 4 to develop a "Butler" finish.



Operation No. 11 is used after operation No. 4 to develop a wire brush finish.

Operation No. 12 is a cleaning operation necessary to remove the film of grease from any grease wheel—finishing operation or buffing operation.

With highly cold rolled sheets and strip to be polished in the flat, operation No. 3 followed by No. 4 is all that is necessary to develop a standard No. 4 finish. Formed articles from sheet and strip are polished with operation No. 4 followed by No. 5, all that is necessary to develop a finish such as used on utensils and store fronts. In quite a few cases,

TABLE I

Name of Operation	No. of Operation	Grit	Manf. Abrasive	Turkish Emery	Wheels	Dry	Grease	Compound	Approx. S. F. P. M.	Finish
Grinding	1	No. 36 or No. 60	X		Rubber or Bakelite Bond	X			7000-8000	
Roughing	2	No. 80	X		Soft Cotton Fabric, Sewed-Sections or Quick-As-Wink Wheels	X			7000-8000	Rough Ground
Greasing	3	No. 100	X		Ditto		X	Polishing Tallow	7000-8000	Grease Finish
Greasing	4	No. 120 or No. 150	X		Ditto		X	Polishing Tallow	7000-8000	No. 4 Finish and Base for No. 4
Greasing	5	No. 160	X or	X	Ditto		X	Polishing Tallow	7000-8000	Base for No. 7
Greasing	6	No. 220 or No. 240	X or	X	Ditto		X	Polishing Tallow	7000-8000	Base for No. 8
Cutting-Buff	7				Bias or Pocket			Aluminous Oxide Buffing Compound	10,000 Min.	No. 8
Color Buff	8				Loose Disc or Canton Flannel Buff			Ditto—For coloring only	9,000 Max.	No. 8
Tampico	9				Tampico Brush			Powdered Pumice, Kerosene, Oil	5,000 Max.	No. 6
Special	10				Bias or Pocket Buff			Lea Compound Grade E	5,000 Max.	Butler
Special	11				Stainless Steel Brush			Stainless Wire Brush	5,000 Max.	Wire Brush
Cleaning	12				Canton Flannel Cloth—Hand Operation			Whiting or Precipitated Chalk		



On the facing page—First grind of a weld using 36 or 60 grit wheel. On this page—Top—Second grind of weld to remove all grit lines (No. 80 grit wheel); Middle—First polish (greasing) No. 100 to No. 240 grit; Bottom—Final polish for mirror finish. Note in two top photographs the use of protective paper to prevent marring polished surface.



however, such as in utensils, it is necessary to anneal the formed parts during fabrication. The polishing cycle necessary following annealing and drawing operations will depend largely on the condition of the drawn parts as they come out of the dies or after the scale is removed. In most cases, grease grinding, such as operations No. 3 and No. 4, is all that is necessary.

On articles which are spun entirely to shape, it is quite frequently necessary to use an operation such as No. 2 in order to eliminate the tool marks.

A number of finishes other than those mentioned above can be developed with fine dry grits or abrasive cloth.

Continuous buffing such as is used in buffing moulding made from coils of stainless strip, require the fundamentals of No. 7 and No. 8. Sufficient buffs are, of course, necessary so that the various contours of the finished moulding are satisfactorily buffed.

In any polishing or buffing operation it is very helpful if the work can be oscillated, or in the case of continuous buffing, the buffs should be set at an angle. The last buff or finishing operation must, of course, be in a straight line and the last finishing pass must be made in the direction of the rotation of the wheel.

General Instructions

Do not use wheels or buffs that are contaminated with other metals.

Do not use any buffing or greasing compounds which contain iron oxide, always specify iron oxide free compounds for buffing stainless steel.

Do not use any Turkish Emery as a last finishing operation on stainless, because of the possibility of iron contamination which will result in discoloration of the stainless.

Since, as mentioned above, the stainless steels are tougher to grind and polish than ordinary steels or non-ferrous metals, it is essential that the preparation of the set-up wheel be made very carefully. The following procedure is suggested for the treatment of glue and the proper ration of glue and water for the various grits:

Selection

The use of a good grade of animal hide glue is essential. Bone glue, fish glue and cold glue preparations are relatively inefficient. Commercial products such as "Grain Lock" and other binders are being used successfully without heating.

(Continued on page 93)



A Copper-Covered Planetarium Dome

THE City of Pittsburgh soon will have the fifth planetarium in the United States. The building, with all necessary equipment, is a gift to the city by the Buhl Foundation as a memorial to Henry Buhl, Jr., Pittsburgh merchant and philanthropist, whose will created the foundation after his death in 1927. The cost of the planetarium, including the equipment, will be \$1,070,000. Included with the planetarium will be an Institute of Popular Science where operating models will demonstrate the progress of science in many specific fields. The planetarium was designed by the Pittsburgh architectural firm of Ingham and Boyd.

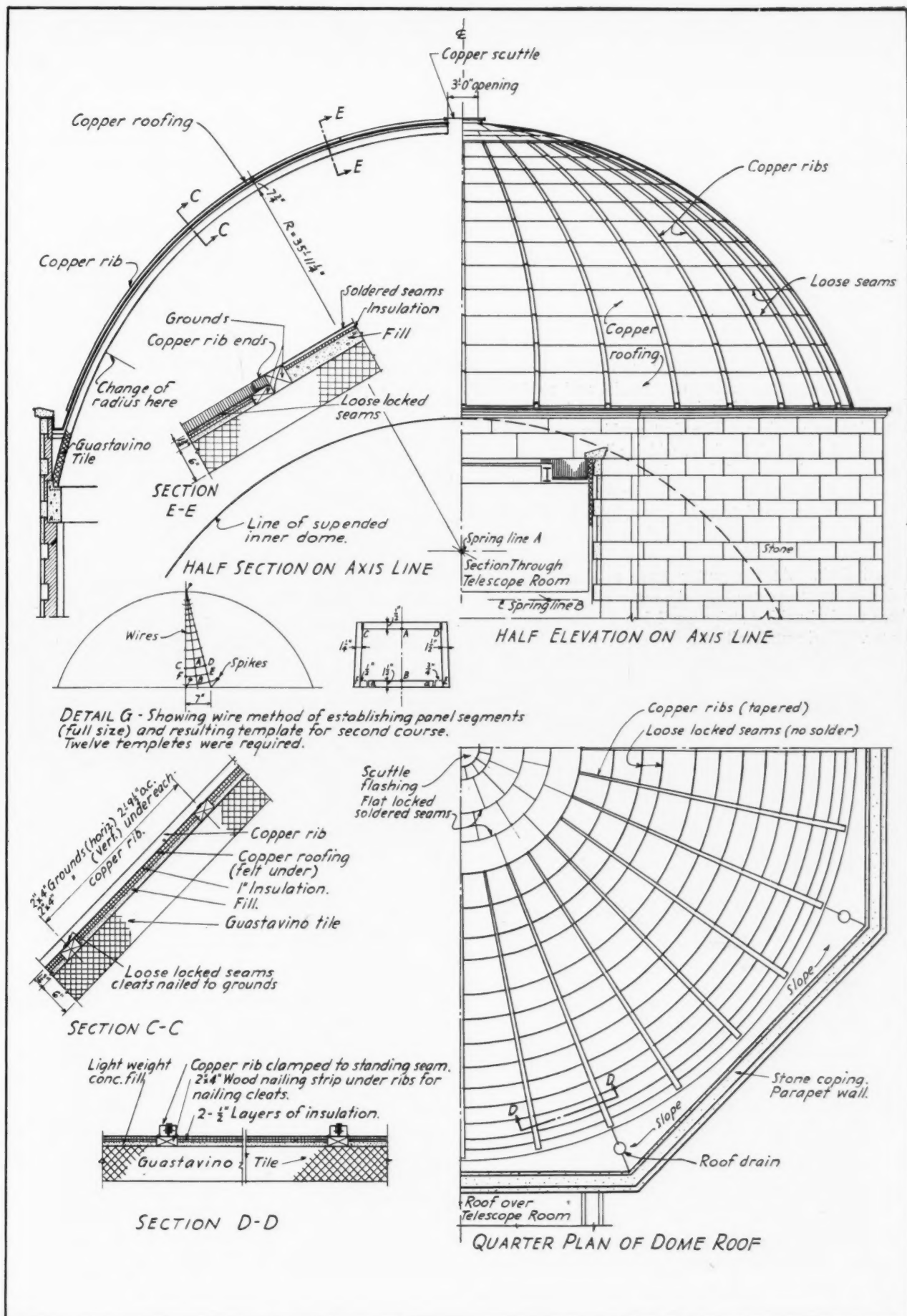
Dome Construction

The structural feature of most interest in a planetarium, quite naturally, is the dome. This dome in the planetaria built to date, is a double structure—the inner dome is a huge picture screen; the outer dome

is the roof. The audience sits beneath the inner dome while a complicated and wonderful projector reproduces on the dome the heavens in exact position at any given hour, today or tomorrow, a thousand years ago or a thousand years in the future, from any location on the earth, or sends the universe wheeling through time at an accelerated pace so that a year's cycle can be pictured within a few minutes.

The outer dome which forms the roof is 75 feet in diameter (including the narrow gutters) 24 feet high (gutter line to crown), producing an arc 34 feet long. The arc of the dome is laid out on two radii. The radius of the upper part is 36 feet 7 inches; the radius of the lower part of the arc is 42 feet 6¾ inches starting at the base to a point 8 feet above the base.

In construction, this outer dome consists of a Guastavino tile shell on which is fastened vertical and horizontal 2 by 4-inch cleating ribs. The surface between



Group of details showing copper application, seams, hips, templates, etc. On facing page Perritt mechanics are laying sheets in one panel. The special, strap iron ladders were found useful

ribs is leveled to true contour by applying a soft concrete fill. On this fill, after leveling, is applied one inch of rigid insulation and this insulation, in turn, is covered with a 40-pound asphalt impregnated felt. The weather surface is 24-ounce copper laid with standing seams running vertically and flat locked (unsoldered) horizontal seams. Special copper ribs run vertically over the standing seams.

The copper roof was designed, fabricated and laid by Perritt Iron and Roofing Co., one of Pittsburgh's oldest sheet metal and roofing contracting firms. To cover the dome some 15,000 pounds of copper were required.

Sheet Metal Construction

The procedure followed by the Perritt company to fabricate and apply the copper was worked out to eliminate all possible waste of material and to deliver the sheets to the project in as near "ready-to-apply" condition as possible. The first problem was to prepare a set of templates from which all sheets required could be sized, cut and formed. Since the dome is a series of adjoining panels with all panels identical in dimensions the template used was a full sized panel.

The details of construction show that the nailing strips run vertically from gutter to base of the flat locked deck. At the gutter these nailing strips are 7 feet center to center. At the outer edge of the deck these vertical nailing strips are 2 feet 2 inches center to center. Horizontal nailing strips run around the dome

in concentric rings $33\frac{1}{2}$ inches O. C. apart. One panel consists, therefore, of a series of trapezoidal sheets the longest dimension being approximately 7 feet for the bottom edge of the bottom course sheet and approximately 2 feet 2 inches for the upper edge of the upper course sheet. Since all sheets are $33\frac{1}{2}$ inches wide between parallel horizontal cleating strips (36 inches before seaming) one panel requires 12 sheets, all of different measurements.

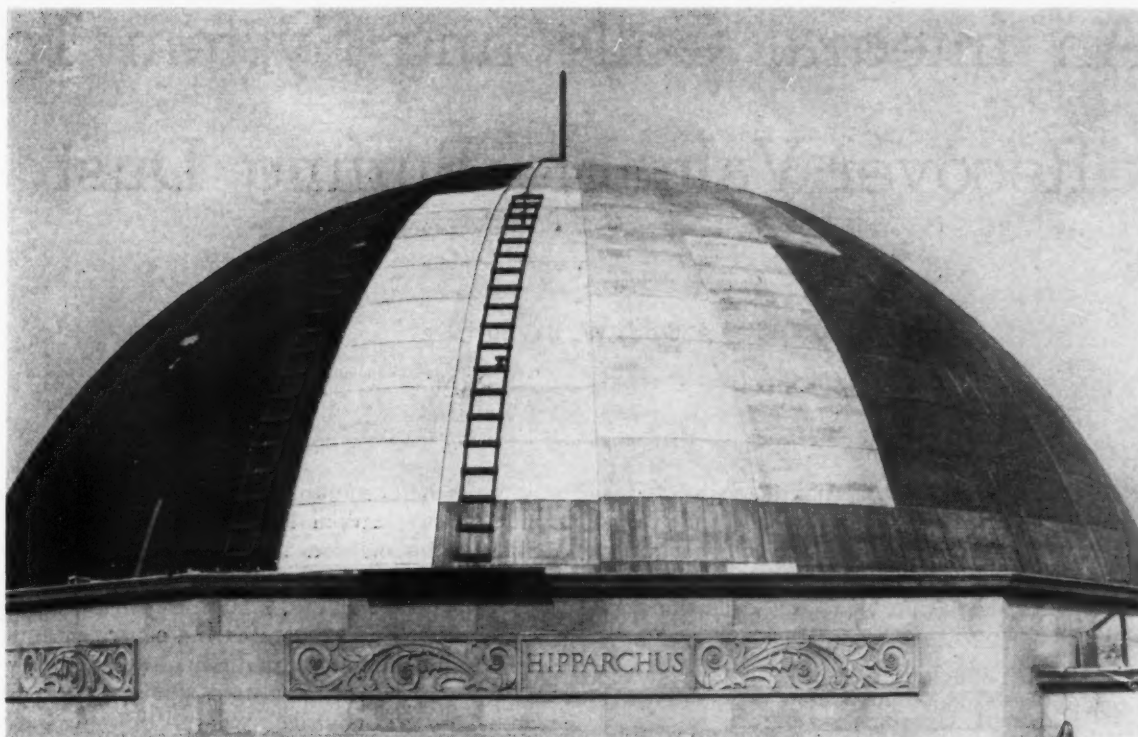
How Templates Were Established

To establish the sheet templates for a complete panel, the center point of the dome was plotted and a heavy spike was driven into the dome. A wire was then stretched from this pin to the gutter along one of the center line ribs to another spike at the gutter. Seven feet over from this gutter spike, another spike was driven and another wire was run from this spike up to the center point spike. Between these three spikes, then, the contractor had a full panel less metal required for seams. Arcs were then struck across the dome horizontally to establish the parallel, horizontal limits of the sheets. Measurements between wires horizontally and between struck arcs vertically, gave the dimensions and templates for each of the required 12 sheets in the panel.

From these templates, plus metal for seaming all the sheets required were cut. There was required (see layout) 32 sheets of each size or 384 sheets for the dome from gutter to deck. The only difficulty en-



Sheets were cleated along the top seam to hold the sheet in position after the lower seam had been inserted in the double lock. Then the standing seam (right edge) was formed and the cleats on the left edge were nailed down. The standing seam was finally formed after most of a panel was laid. (See photograph on first page of article). Note "turn out" for gutter at edge of lower sheet



Photograph of partially covered dome before the special hip caps were applied. Photograph shows true arcs of the seams, a very necessary result for appearance

countered was the fact that cleating strips did not center exactly so some variation in some sheets was needed.

Further to save waste, sheets were purchased from the supplier, C. G. Hussey and Co., in strips 36 inches wide and in varying lengths and sheared so that two pieces were used in each section between vertical seams.

The photographs show the sheets being applied. All sheets are cleated on all four sides with cleats about 8 inches center to center. Standard practice of turning the cleat over the nails and turning the cleats into the fold of the seams was followed. The vertical standing seams are 1 inch high finished; the horizontal seams are $\frac{3}{4}$ -inch edged, flat locked. No solder was used on this part of the dome.

Special Rib Caps

One departure from common practice was used. The standing seams are capped with a tapered rib of 32-ounce copper, 3 inches wide and 2 inches high at the bottom of the dome and tapered to 2 inches wide by 2 inches high at the junction of the circular, flat-locked area at the top of the dome. These ribs are held on the standing seams by brass clamps made by Perritt; these clamps bind to the standing seams by set screws and clamps are spaced 2 feet on centers.

(See detail, Section D-D.) The ribs were formed on special dies made up in the Perritt shop.

The top area of the dome (see detail) where the surface is nearly horizontal is divided from the lower area by the "step-up" shown in detail in Section E-E. The top sheet of the lower area is flat locked to the lower edge of the sheet on the deck as shown. On this deck all seams are flat locked and soldered. Vertical seams are not continuous, but alternating.

Gutter Design

The gutter around the base of the dome is built up as illustrated in Section B-B. The gutter is 24-ounce copper laid flat-locked and soldered. The copper is carried from under the throughwall cap flashing at the coping, down the outside wall of the low parapet, across the gutter (which varies in width, see plan) and up the base of the dome to a distance of 36 inches where the dome covering is loose locked to the gutter sheet. At each of eight high points an expansion joint was installed. (See plan of dome.)

Regarding expansion, it is believed that because the dome covering proper is not soldered or nailed at any place and is loose-locked and cleated and therefore free to move in the cleats there should be no trouble from expansion or contraction.

As in all planetaria, there are two domes. The inside dome (see detail drawing) is suspended and acoustically treated and serves as a picture projection screen. The preparation of the sheets which make up the inner dome is intricate. A description of the inner dome will appear as soon as photographs are available.

An Integral Collecting System To Recover Valuable Buffing Dust

By J. W. Baybutt

A READER of American Artisan requests information on practical methods for collecting valuable dust from a buffing machine and submits sketches (Figs. 1, 2, 3) showing the present equipment. He outlines the problem and conditions as follows:

"This buffing machine is used in a jewelry repair shop for buffing gold and other valuable metals. All the dust is collected and saved and later is sent to a place where they remove the valuable metals.

"We piped up the hoods as shown in Fig. 1 and Fig. 2, using the hoods that were on the machine and connected to the hoods in the back as shown. This part of the system works out all right. At present we are using an ordinary cloth bag on the fan outlet until we find out what is best to do about the dust collector.

"We thought of building a regular type dust collector for the job, but from our experience we find that this fine dust is very hard to separate and therefor lacking any better way of doing this we show on the drawing (Fig. 3) a galvanized container size 36 inches long by 12 inches high and 14½ inches wide with a canvas bag attached to one end. This bag is 24 inches high, 9 inches thick by 14½ inches wide. The galvanized box has a drawer which is pulled out to clean out the dust. The amount of dust gathered in one day is very little so the box would be plenty large for at least two weeks run. We felt that if we placed this box under the machine as shown by the dotted lines in Fig. 1 it might work all right. The question is would this canvas bag allow enough air to pass through so as not to set up too much back pressure on the fan.

"We made some tests with a water gauge by placing a cardboard over the hole of the air outlets of each hood and took the tests with the branch pipe of the other hood open.

"As shown in Fig. 1, the hood on the right side of the machine has a ½ inch water gauge pull and the one on the left has a water gauge pull of 9/16 inch. The tests were made with the blower disconnected to any kind of dust collector, but was left wide open as we have nothing but a bag at present to catch the dust."

Recovery of valuable materials in an exhaust sys-

tem can be accomplished in a number of ways, the amount of material to be recovered usually determining the method to be employed. Electric or magnetic precipitation, water in various ways, low air velocities, baffling, numerous varieties of paper, cloth, etc., viscous surfaces and centrifugal methods are the most common methods in use today.

In the problem submitted and shown in Figs. 1, 2, and 3, the subscriber reports 9/16 in. water suction pressure at the hood. From this information, we estimate a possible 2,100 ft. per min. velocity through the 5 in. pipes which gives us a total of about 570 cfm for the 5 in. connections. The area of the bag is about 10 sq. ft. which will produce about 57 fpm velocity of air through the surface. Ordinarily this velocity is considered excessive resulting in power waste and more frequent cleaning of the bag to maintain the exhaust hood efficiency, but many systems have justified themselves even on this basis.

As an alternate scheme to the one submitted, consideration might be given to the method shown in Fig. 4. Here it is assumed that the fan and motor must be left in their present positions. The area available in this scheme would be about 54 sq. ft. allowing 1 in. on centers for the strands. Each strand would be 9 by 24 inches and there would be 28 strands at each end. A suggested method of fastening is shown in Fig. 5. Possibly standard manufactured units, using paper or cloth, could be substituted with some saving.

The air velocity through the cloth in this method would be about 10 fpm which should result in more efficient cleaning than the higher velocity of Fig. 3. The disadvantage of this method is that the filter unit is under pressure with possible valuable dirt loss through leakage in the joints.

Assuming that the motor and fan could be relocated another scheme is submitted for consideration as shown in Fig. 6. This scheme would allow for low velocity in the cleanout tray and would provide about 200 sq. ft. of filtering surface. The fan discharge could be run to outside or suitably deflected in the room to save heat, especially in winter. The fan speed should be changed if too great a suction develops at the hood with this arrangement as too great a suction at the hood might cause valuable metal losses. It is, of course, understood that the buffing wheel speed must be maintained.

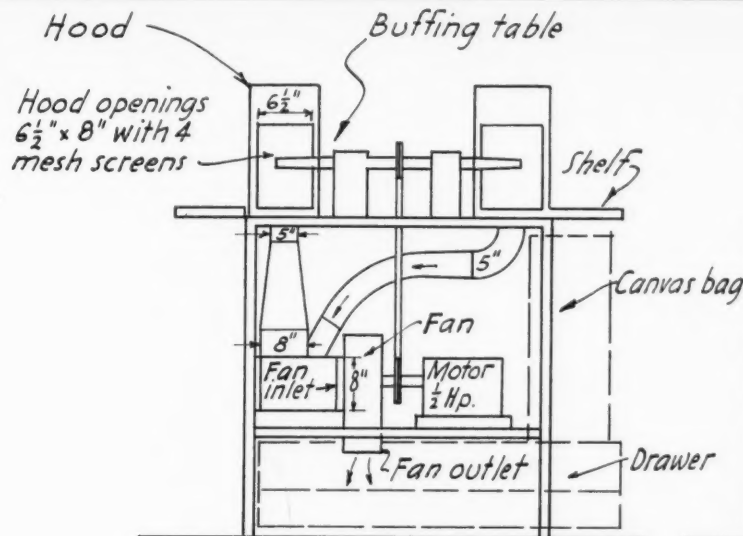


Fig. 1 Front View.

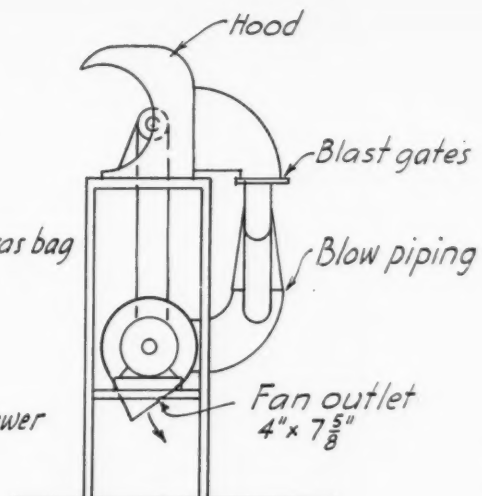


Fig. 2 Right End View.

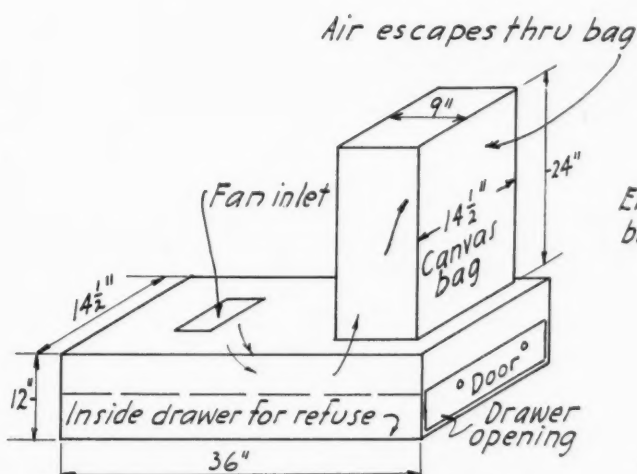


Fig. 3 Container and Canvas Bag.

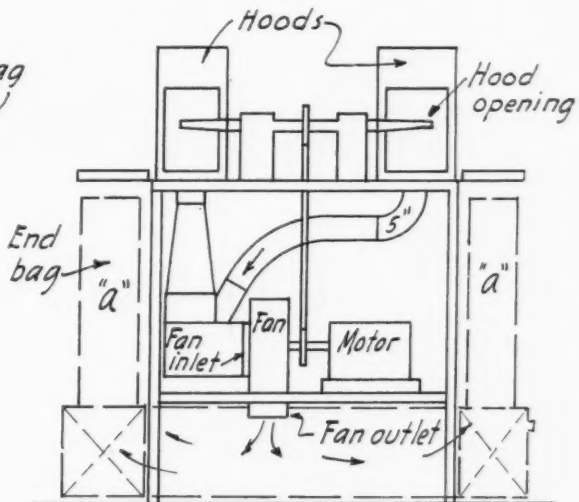
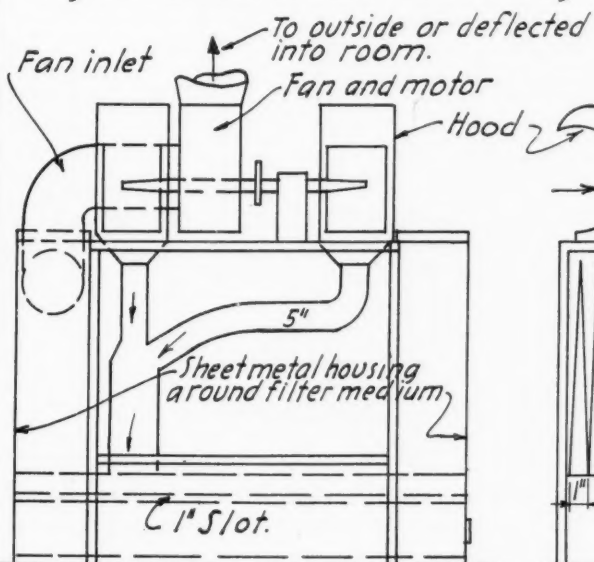
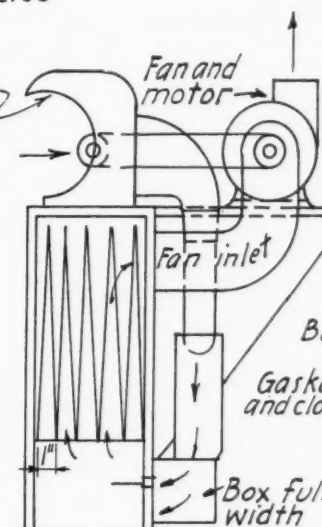


Fig. 4 Front View



Front View



End View

Fig. 6

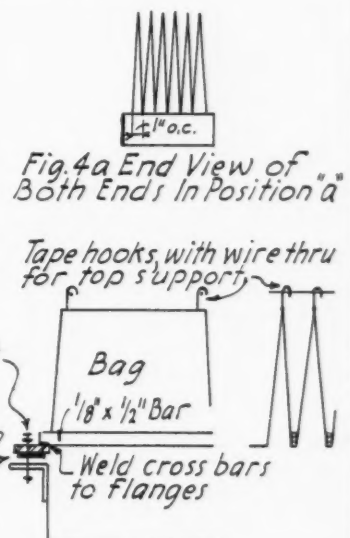
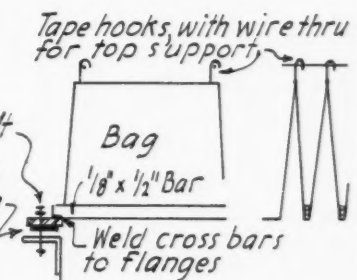
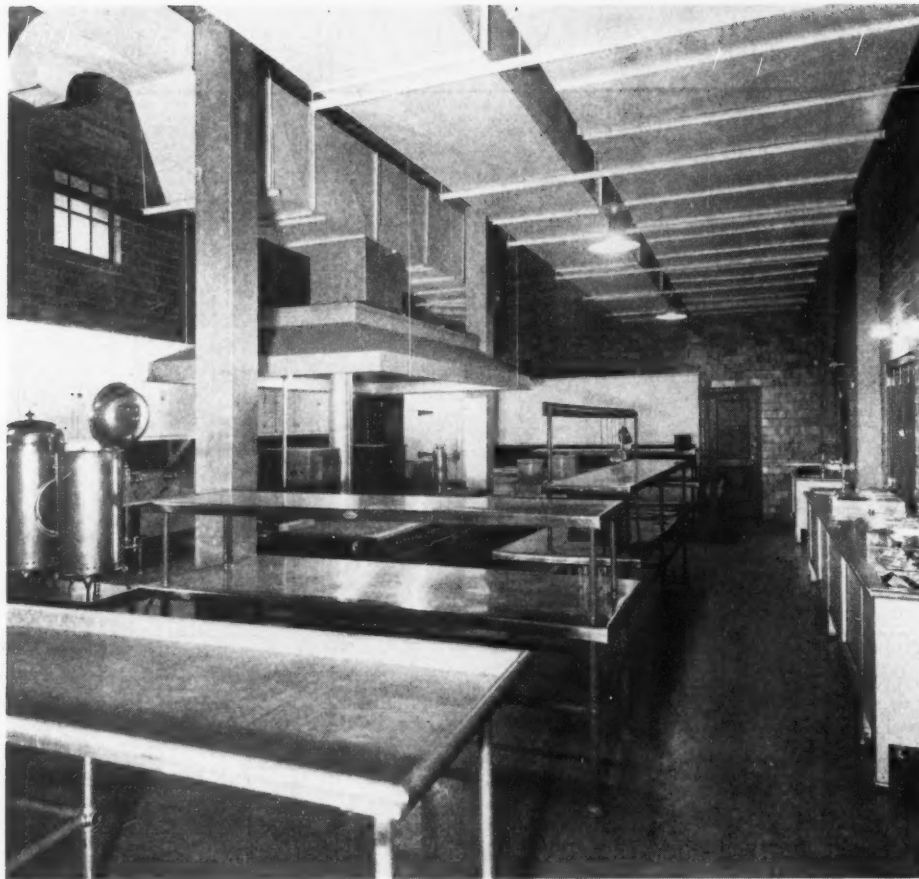


Fig. 4a End View of Both Ends in Position "a"



Detail of Hanging Bags
Fig. 5



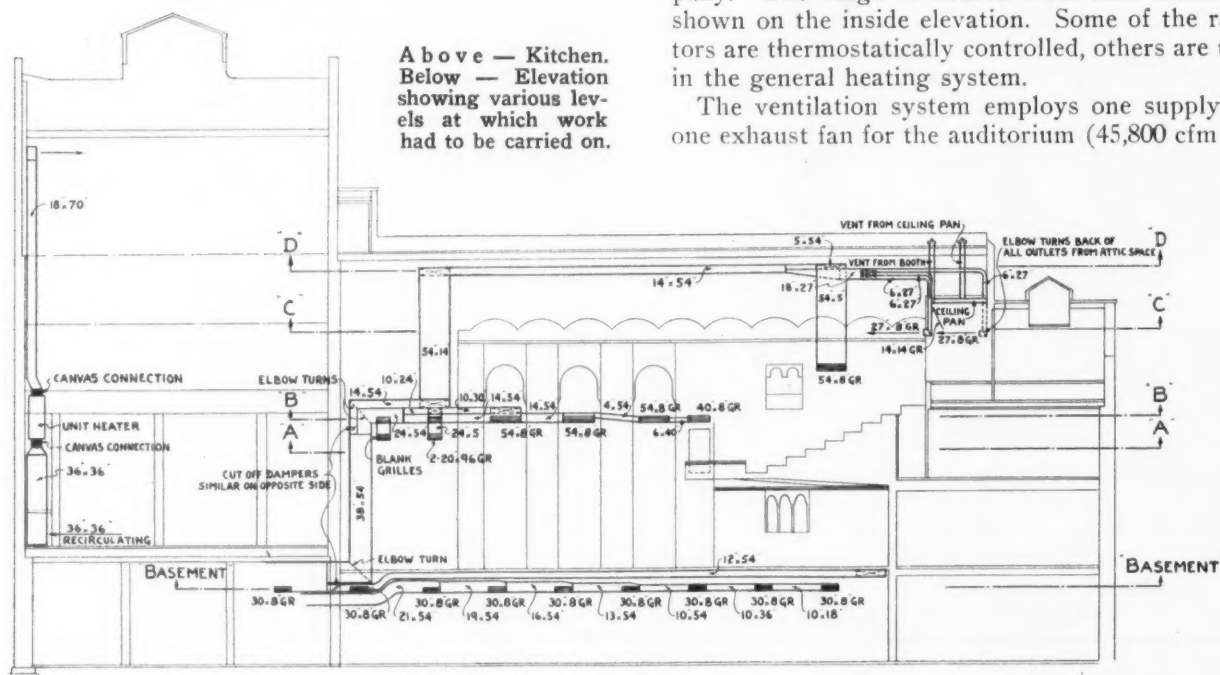
A "Five-Level" Ventilating System

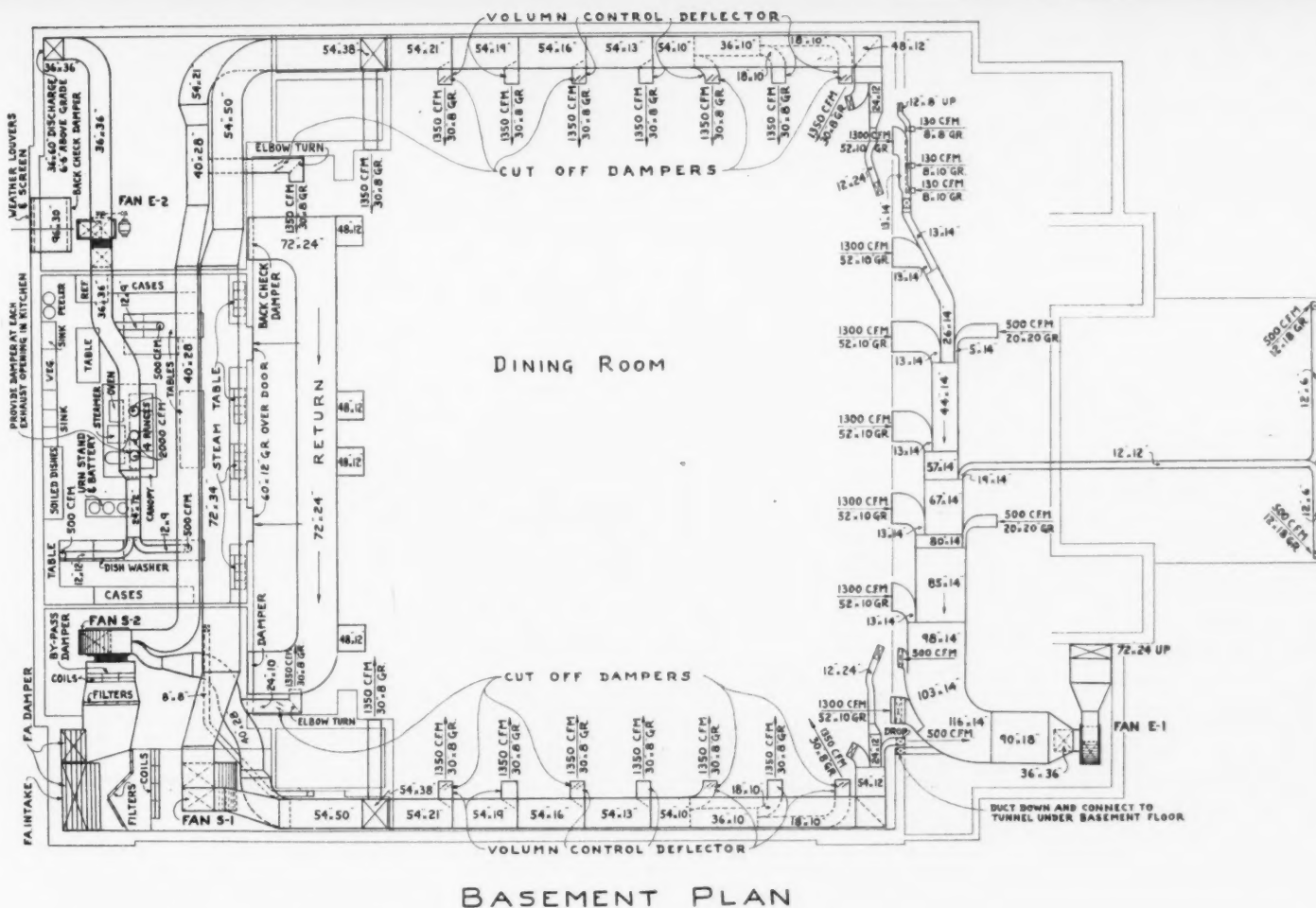
A VENTILATION system of more than usual interest, because of the sheet metal installation problems involved, is pictured in the drawings. This system is installed in the Mohammed Temple building in Peoria, Illinois. The building was partly destroyed by fire and rebuilt, with additions, so that some parts of the building are old, requiring chang-

ing existing equipment, and other parts are new, with new equipment. The sheet metal contractor who installed the work is Fred Hauer and Co., Peoria. The architects were Jameson and Harrison, Peoria, and the consulting engineer, S. Alan Baird.

The building is heated primarily by direct radiation with steam supplied by the public service company. The stage is heated with unit heaters as shown on the inside elevation. Some of the radiators are thermostatically controlled, others are units in the general heating system.

The ventilation system employs one supply and one exhaust fan for the auditorium (45,800 cfm sup-





With so much of the basement floor area occupied by the dining room, space for all the duct work and equipment was fairly restricted. The finished installation looked like this. Below—Ducts at under side of balcony.

ply, 10,900 cfm exhaust); one supply fan and one exhaust fan for the basement dining room (26,200 cfm supply, 12,800 cfm exhaust); one kitchen exhaust fan (8,730 cfm); one toilet exhaust fan (3,200 cfm); all fans connected into supply or exhaust duct work as shown on the plans.

The two supply fans are located in a special room in the basement (see the basement plan). Air to the fans is brought in from outdoors through weather-tight louvers, then passed through filter banks for cleaning, then through steam coils where the air is tempered, then through the fans and on into the ducts.

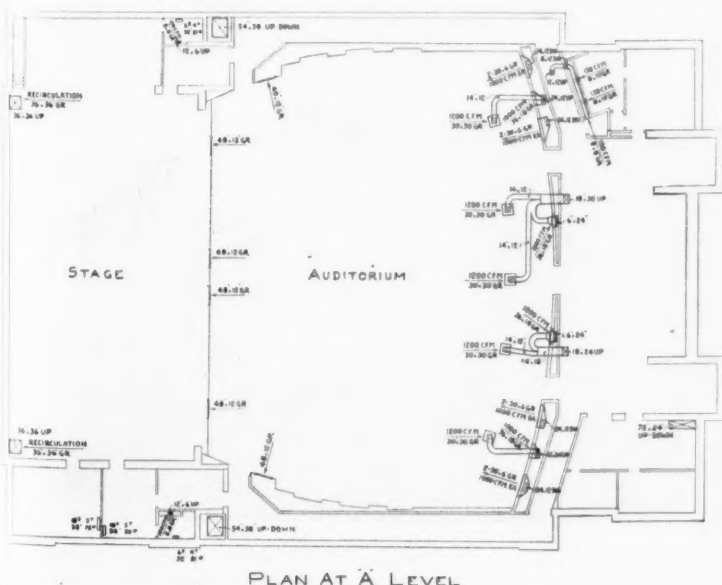
Two of the exhaust fans (kitchen and basement dining room) are located in the basement; the auditorium exhaust fan is located in the attic (plan at "D" level) and the toilet exhaust fan is also in the attic.

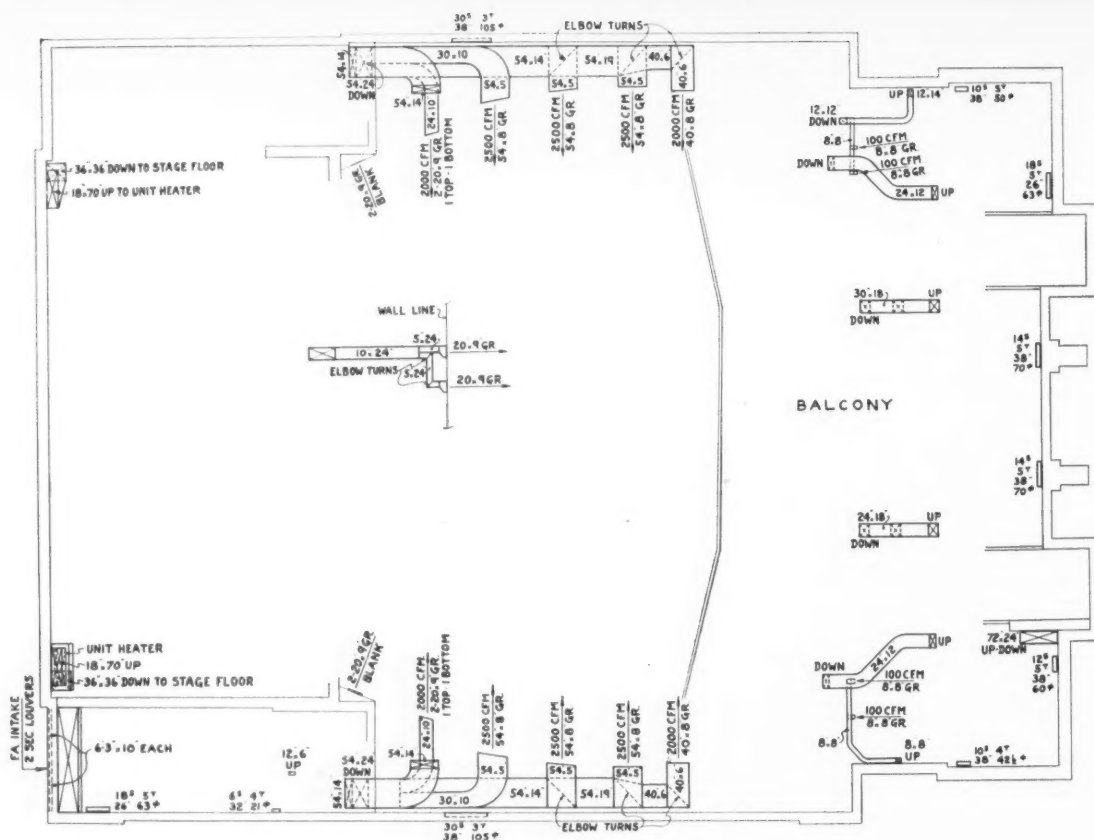
The Problem of Erection

The chief problem on this contract, as may be visualized from the drawings which show duct work at several elevations throughout the building, was to get the duct work properly located in the spaces available and to get the metal work installed with a minimum of labor time. There was in the contract more than 59,000 pounds of galvanized iron (26 to 18 gauge), several hundreds pounds of 12 and 18 gauge black iron for the kitchen hoods and duct work, and several hundred pounds of light weight angles for framing, duct supports, etc., all painted.

It was decided to make up the duct sections complete, ready for hanging, in the Hauer shop and to truck the sections the few blocks to the job, but because of the intricacy of fitting ducts into place a supplementary shop was rented in a garage across the alley from the temple where a brake and hand tools were installed for last minute changes. Careful and constant measurement on the job was required at all times, since ducts twist through the building as shown and only actual measurements could obtain the close fitting required.

The erection methods probably can be explained quickest by following typical systems through the





PLAN AT B LEVEL

About level with the rear of the balcony all the supply grilles for the auditorium come through the side walls. The ducts feeding these grilles run through passageways alongside the auditorium wall. Part of the balcony ventilating system appears at the rear of the room. Below—Exterior of the rebuilt building.

building. The basement dining room is ventilated by air which enters through 16 grilles placed down the two sides walls as shown on the basement plan. The two ducts from fan S-2 (each 54 by 50 inches) are concealed within the upper corners of the dining room in a beam effect. These ducts are covered with $\frac{1}{2}$ -inch of rigid insulation cemented to the duct and secured with sheet metal screws as needed; joints in the insulation are sealed with asbestos cement and the whole is wrapped with 4-oz. canvas pasted on. The duct was then plastered in. The duct was constructed in complete sections either straight pipe or elbow takeoff sections and was hung from movable scaffolding. Standing seam, stiffener drive cleats were used and the duct was supported by angle and strap iron trapeze hangers.

The exhaust system for the dining room is all located in the basement as shown on the plan and is quite similar in size and sections to the supply, hence the erection procedure was identical.

The Auditorium System

The auditorium system was more complicated. The supply fan (S-1) connects into two mains which run to points at opposite ends of the stage above. Risers 54 by 38 inches (see plan at "A" level) carry up through concealing partitions to the level of the proscenium arch ("B" level). A passageway from stage stair to balcony runs along both sides of the auditorium and the ducts run through these passageways against the ceiling. As will be noted, these ducts are shallow. All the air which enters the auditorium in front of the balcony comes through these grilles. The ducts in these two branches were erected from the same scaffolds and in the same manner as basement pipe.

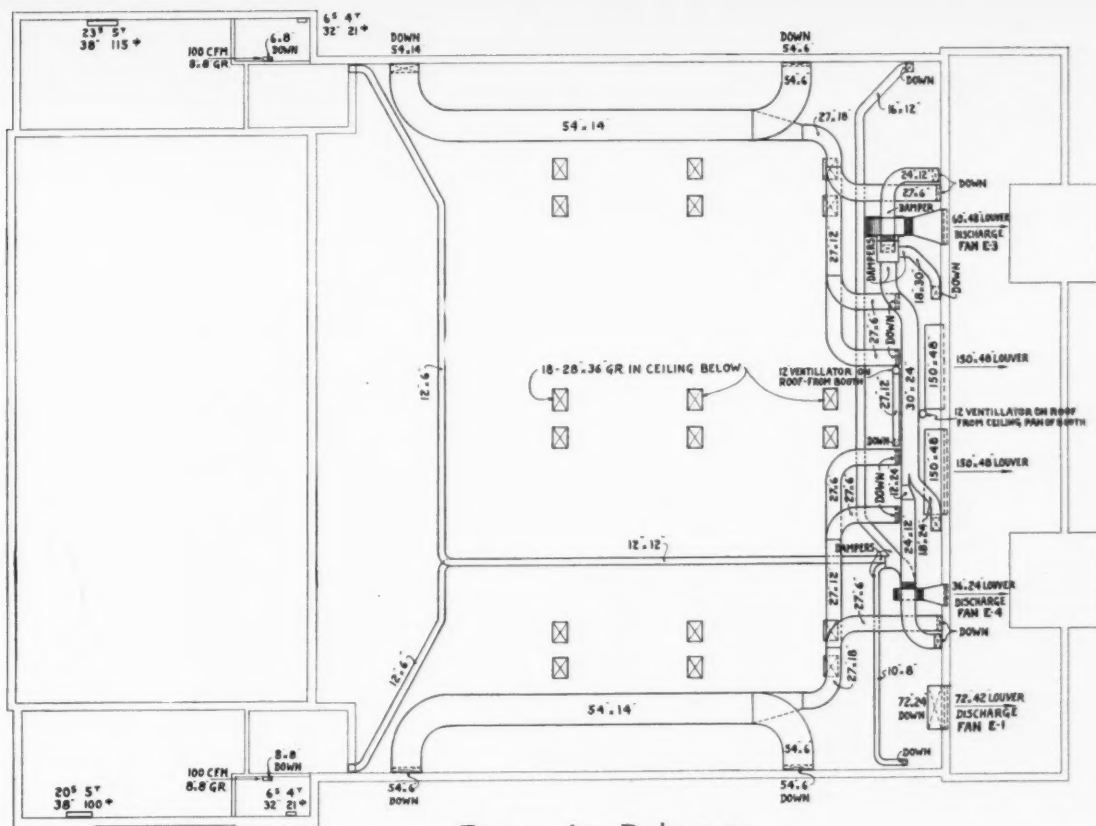
Where each of these branches turn off the main risers, another riser continues on up to the attic, runs along the bottom chords of the roof trusses to about the front edge of the balcony and divides. One division drops down to a large supply grille about one-half way up the balcony; the other division continues to the rear of the balcony and supplies air to three grilles in the rear balcony wall. Erection of the duct sections through the trusses was simple; the riser portions were formed in units 10 feet long using standing seam drive cleats and flat locked seams. Risers are supported at each floor level on $1\frac{1}{4}$ by $1\frac{1}{4}$ by $\frac{1}{8}$ -inch galvanized angles which rest on the concrete floor or beams. All these risers are in partition walls and were erected before plastering.

The exhaust from the auditorium has two divi-



Supply of air to the balcony comes up from the basement, passes through the attic as shown and goes down to seats. Exhaust air from the balcony and corridors goes up into the attic fan and out. Attic duct work rests on the bottom chords of the roof trusses.

Below — General construction of the hood over the kitchen cooking range.



PLAN AT D LEVEL

sions. From the rear of the auditorium, under the balcony and at the balcony floor, exhaust fan E-3 withdraws air; from the stage face a gravity system opens into the kitchen through two back draft dampers and in the auditorium ceiling 18 grilles permit "foul air" to enter the attic space, from which the air is exhausted by ventilators.

The Kitchen Exhaust

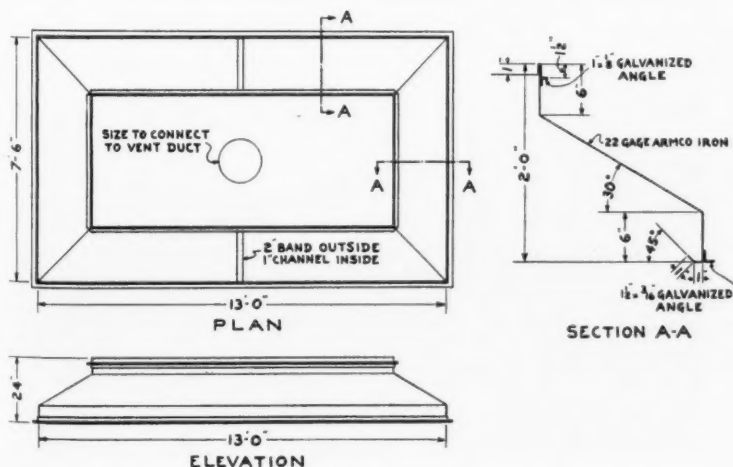
The remaining interesting system is the exhaust from the kitchen, shown on the basement plan and in the photograph of the kitchen. The system has its own fan (E-2) located in an adjoining room and vented through a stack which opens through the rear wall above grade. To this exhaust system is connected ducts from the dish washer, steam table, coffee urns, four cooking ranges, and work tables. Over the four ranges the rising hot air is collected by the hood constructed as shown in the detail. The hood is 22-gauge galvanized iron on an angle iron frame; the duct work, on the other hand, is 12-gauge black iron, painted, with riveted seams and stiffener joints suspended on trapeze angle

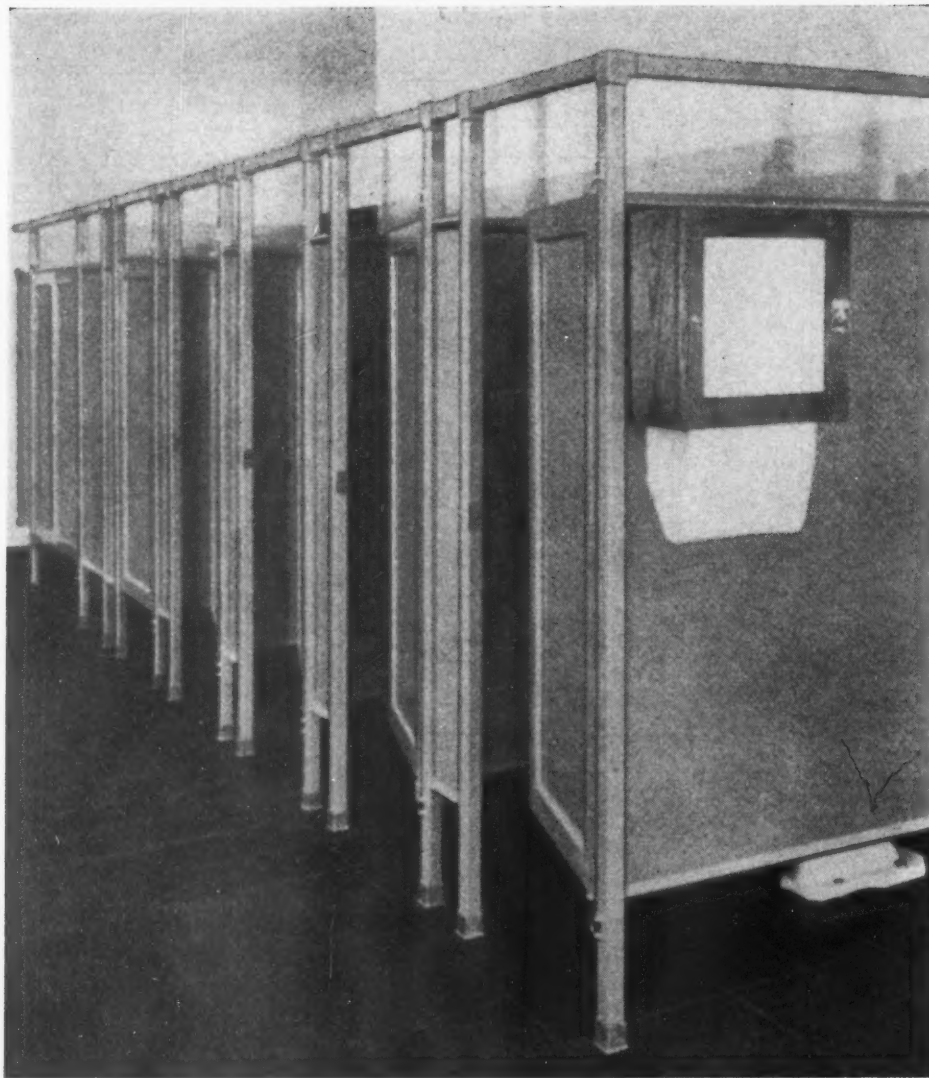
framing. Space and head room in the kitchen, as the photograph shows, was more than ample and ducts could, therefore, be dimensioned and formed with few difficult erecting problems.

Housings, Filter Bank, etc.

There are a few additional features of interest in the specifications. All turns in the duct work and elbows were specified "easy turns" with radii at least twice the duct width up to widths of 12 inches and not less than the width in ducts over 12 inches wide. Where such were impossible, elbow turns were required in the diagonal of the elbow. The sheet metal housings for the two supply fans were built of 18-gauge galvanized iron on suitable and continuous angle iron framing with the angles forming a lattice of squares not over 3 feet on a side. The Hauer contract included an angle iron framing for the two filter banks; all access doors, and shut off or balancing dampers ahead of every supply or exhaust grille. These dampers were made of a single thickness of galvanized iron with hemmed edges, $\frac{3}{8}$ -inch damper rods, quadrants to lock the dampers in position; and the painting of all exposed ducts, housings, etc., with one coat of metal primer and two coats of lead and oil paint in a grey-green color.

Incidentally, proof of performance was laid on the sheet metal contractor; he to prove the specified rpm of the fans and motors, electric consumption of the motors and the air delivery or exhaust at each opening. Included were the grilles—all directional flow, the sheet metal work needed with the stage unit heaters, a gravity ventilating system and hood for the picture projection booth, the cleanable filters with washing and oiling tank, and all fans and motors.





Toilet Partitions and Shower Stalls—

*Specialty Items
by Fiat*

By R. C. Nason

TWO interesting and profitable sheet metal specialty items which have found ready acceptance have been developed by Fiat Metal Manufacturing Co., Long Island City, N. Y., and Chicago, Ill. These are sheet steel toilet partitions and sheet steel shower stalls. From the shower stalls has branched a third specialty item—glass tub and glass shower enclosures. Acceptance of these items has been increased by the present day tendency to substitute sheet metal for wood or more expensive materials like marble and the growing popularity of shower bathing over tub bathing. Fiat, now entering its twentieth year of sheet metal fabricating, has so expanded its market for these products that continuous production is now under way.

Concentrated attention on these two sheet metal items has brought such expertness in design and craftsmanship that the Fiat company is today an important factor in its chosen field. Practically all plant operations are completed with tools and equipment typical of a well appointed sheet metal shop plus special equipment, such as jigs, which reduce time and labor cost.

The Toilet Partition "Line"

Fiat all-steel toilet partitions fall into three general catalog listings, differences marked by simplicity, price, soundproof constitution, sanitation, per-

manence and like features. They are referred to as "Panel," "Flush" and "Plymetal" types. In the "Panel" type, 16-gauge furniture steel is used almost entirely, walls being of single-thickness. It is held, however, that single steel walls may in some instances be subject to criticism due to resonance when struck, plus failure to prevent sound transmission from compartment to compartment. Hence the principal markets for this type have been the commercial and factory fields, railway terminals, or wherever a general utility type of booth suffices.

Corner posts of the "Panel" partition are square tubing $1\frac{3}{4}$ in. in cross section. Sheets that make up side panels are inserted fully into slots in the tubing prior to their permanent fixation. (See detail Fig. 1B.) The post tubing is 16-gauge steel, whereas door may be 16 gauge and their stiles and rails 18



On facing page—Typical installation of Fiat panel type, all-steel toilet partitions, copper bearing furniture steel, doors constructed as in detail A, Fig. 1; partitions as in detail C, Fig. 1. No insulation employed.

Shears and power brakes in the Fiat shop are placed near rear doors so that initial operations require a minimum of material travel. Work progresses from shears and brake to the spray booths and drying ovens.



gauge, 3 in. wide x 1½ in. thick. Folded seams when closed lock panels rigidly in place. Hinges are ball bearing. Hardware, as a rule, is of brass or aluminum, the formerly usually chromium or nickel plated. Finish is of two kinds, that is, painted after erection, or baked enamel, baking, of course being done prior to shipment.

Another feature of this type of construction is the use of diamond shaped panel binders for top and bottom partition panels. Accumulation of dirt on top rails is minimized due to the diamond shape. (See detail Fig. 1C.)

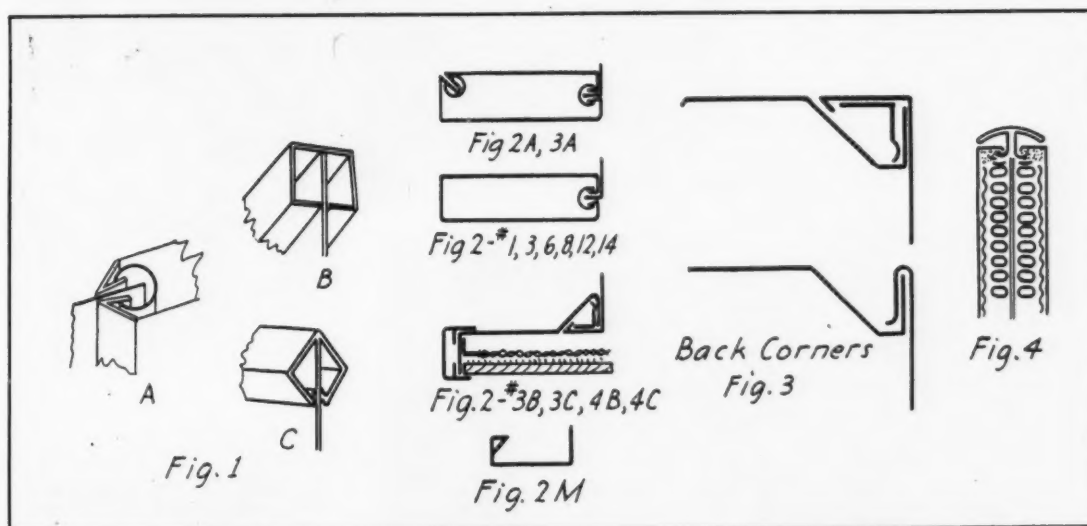
Insulated, "Flush" Panel

What the fabricator refers to as the "Flush" type construction involves the use of lighter gauge steel sheets for panels, but includes corrugated fibre filler sheets between inner and outer panel sheets 1 inch apart. The insulation makes for quieter booths while insuring permanence. This model has gained ready acceptance in commercial buildings, institutions, public buildings, bus terminals and like places

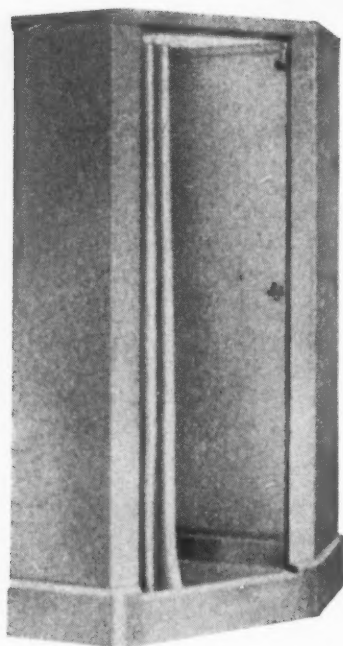
where superior design is appreciated. The fiber filler is cemented to inner panel inner surfaces for good bonding, sanitation and trouble-free service. When struck, sides lack the metallic sound regarded as undesirable and sound transmission booth to booth is minimized although, perhaps, not to the degree found in the fabricator's "Plymetal" booths wherein the filler between panel sheets is kiln-dried plywood. ("Flush" type shown in Fig. 4).

The "Plymetal" Panel

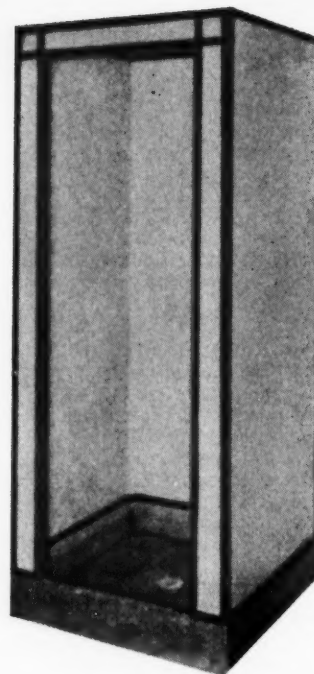
The "Plymetal" design is sold chiefly to schools, clubs, hotels and like places where perfection of craftsmanship and materials are desired. Steel sheets used are 20 gauge. Edges are interlocked with drawn steel, moulded. Corners are welded, thus making tight, damp-proof, vermin-free, sanitary, quiet enclosures. Tracing the general design features of the "Flush" and "Ply" models, partitions and door panels are 1 in. thick. When panels are narrower than 48 inches, 22 gauge is used, but if widths exceed 48 inches, 20 gauge. Interior sheet



Details of construction. Fig. 1A—door stile lock construction. Fig. 1B—front and back post construction for partition. Fig. 1C—Diamond shaped panel binder with double reinforcing shoulders. Fig. 2—Door frame constructions. Top—economy line; center—middle grade line; bottom—deluxe, insulated line. Fig. 3—Back corner constructions for deluxe and economy shower stalls. Fig. 4—Cross section of flush type panel showing insulation.



Two types of shower stalls. At left—medium priced (Marine line), corner type, walls of 18 gauge, rust proofed, galvanized steel finished in white baked enamel. Right—Deluxe (Admiral) shower, free standing type, 16 gauge, enameling iron, white vitreous enamel finish, hollow metal doors.



surfaces are coated with iron oxide primer, baked on.

The shower bath cabinet line, sold chiefly through plumbing wholesalers includes 19 models. Not alone are there rectangular compartments—usually 36 in. by 36 in.—but oblong shapes. Although both may be used for corner setting, there are pentagonal shapes as well for corner location. If building owners should prefer partially enclosed cabinets, perhaps tiled on interior sides, these may be obtained because the fabricator makes a full line of plate glass doors as well.

The standard shower stall door is 2 ft. by 72 in. but may be had in other sizes if required. Edges are metal trimmed. The company also make bath tub enclosures and related items.

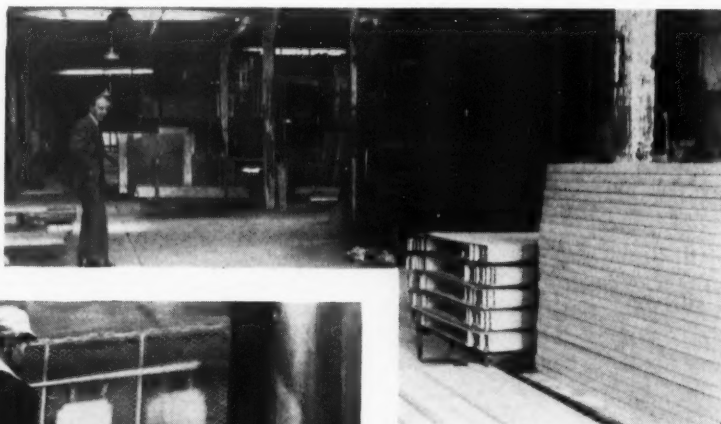
Experience has taught that shower cabinets must be both leak-proof and rust-proof. Advancing these

aims the sheet steel of which walls and ceilings are made are porcelain enameled in some models, baked-on enamel in other models. Another essential feature is the one-piece receptors employed not alone to provide leakless base sections, but to insure good bonding between side panels and receptors. Lead floors are not used in any models. There are no crevices to store moisture and dirt.

Door frames, usually extruded chromium plated brass or aluminum, permit tiling in with recessed models without rust. When such installation is required the sheet metal work is provided with welded-on angle irons to provide for attachment of extruded lath. Door stiles are, preferably, chromium plated, the same being true of door trim. Siding is in single sheets, most often 16 gauge, this thickness of sheeting being largely used in all mod-

(Continued on page 106)

Right—View of Fiat shop from raw material entrance. Power equipment in foreground. Plant Manager H. Nilson, looking at camera.



Left—Interior of spray booth, with exhaust fan in side wall. The grille is a filter bank to catch paint, lacquer, enamel before entering duct and fan.



H & C No. *69 DESIGN

The REGISTER TO USE WHEN UTMOST ECONOMY IS NECESSARY

Don't sacrifice register quality to get down to rock-bottom price. Use the H & C No. 69 Design. For, though it is priced with the lowest, No. 69 is quality-built in every detail, attractive in appearance, and affords excellent concealment of the duct with ample free area—*furnished with sponge rubber gasket to insure streak-proof installations.*

No. 69 Grilles and Registers are interchangeable with corresponding items in the H & C Line. Hence, with the various H & C Frames, No. 69 provides the perfect answer for those installations requiring utmost economy and in which directional air-flow is not essential. By all means bear this in mind and ask your H & C Jobbers to show you the No. 69 the next time you need low-priced registers.

*H & C No. 69 Design is identical with the former No. 68 Design, the class number alone having been changed to avoid confusion with the remarkable No. 86 Design which incorporates the Turning-Blade Valve.

HART & COOLEY MANUFACTURING CO.

Warm Air Registers **H&C** Air Conditioning Grilles
Regulator Sets Dampers • Chain
61 W. KINZIE ST. CHICAGO • ILLINOIS

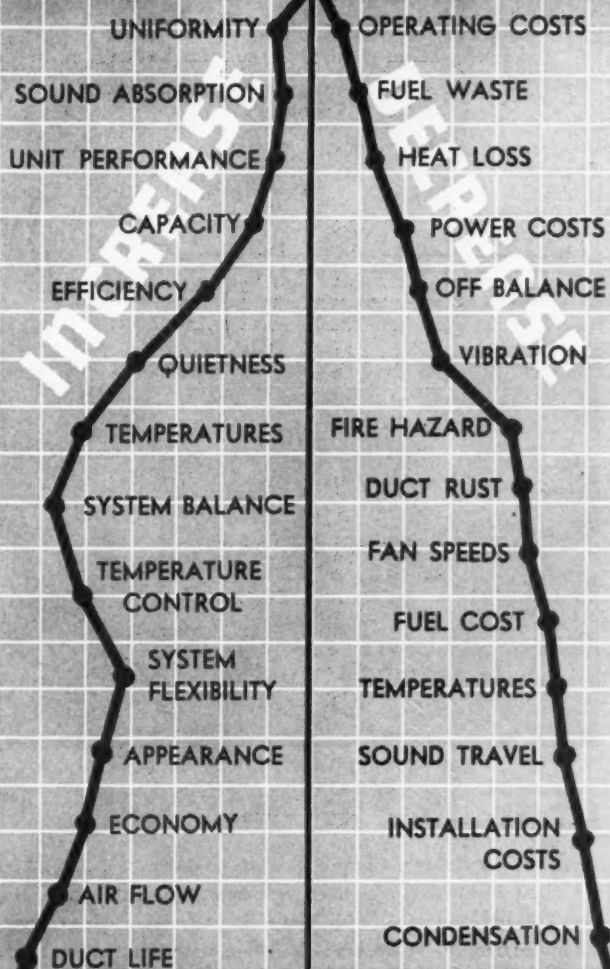
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INSULATE EVERY DUCT

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DUX-SULATION

... FOR A BALANCED AND
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Portrait of an Alert Contractor

out to get his share of the profitable
Summer home - cooling business

Here is the Sales Tool that will make money for heating, ventilating and sheet metal contractors who want to get into the Attic Fan business. Now you can put on a demonstration that effectively **proves** the principles of home cooling with Attic Ventilation **right in your prospect's home.**

VIKING *Animated* DISPLAY to demonstrate Attic Ventilation

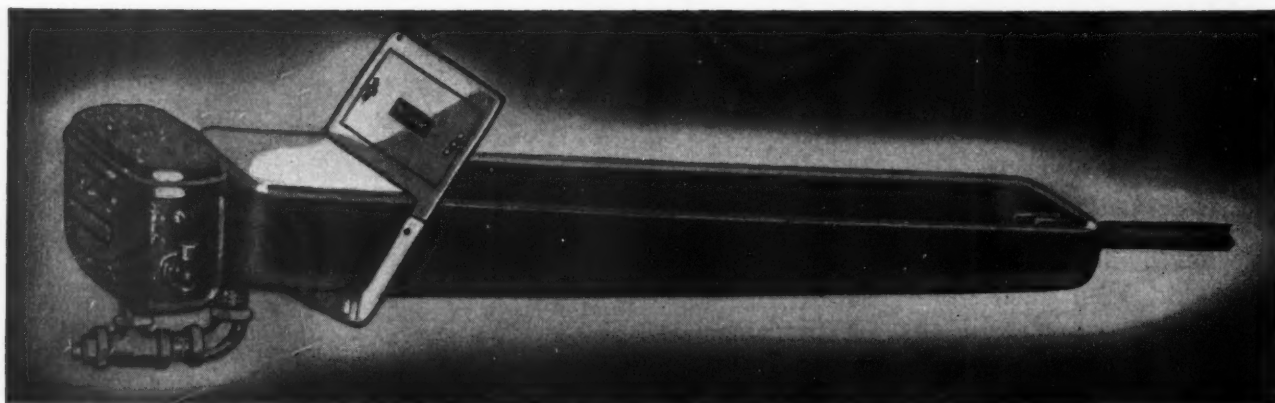
This colorful display can be closed and carried as a neat, compact unit (left) and set up in an instant ready for a demonstration. Lively movement of curtains shows air circulation in every room. Offered—complete—to Viking dealers, at only a fraction of actual cost. Order yours today.



**VIKING AIR CONDITIONING
CORPORATION**

Main & Center Sts., Cleveland, Ohio

VIKING AIR CONDITIONING CORPORATION



HERE IS THE IMPROVED SKUTTLE HUMIDIFIER

Constantly striving to improve their products, the J. L. Skuttle Company is proud to announce their new D. S. Automatic Humidifier. This unit has a steel cadmium collar, cover, and pipe connection to insure longer life and at the same time greatly improve the appearance of the humidifier. Also, the float valve chamber is now made in a black crinkle finish to better harmonize with the silver of the collar and cover. We know that this D. S. unit will help build profits for you—so drop us a line and we will tell you all about it.

•ADJUSTABLE COLLAR TO EASILY INSERT CERAMICS

With this new Skuttle collar you merely unfasten two thumb bolts, take off the name plate and insert the ceramic unit. It is also easier to install the D. S. unit with this type collar.



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INFORMATION

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ASSOCIATION ACTIVITIES

National

The Mid-Year convention of the National Warm Air Heating and Air Conditioning Association will be held June 5, 6 and 7 at the Stevens Hotel, Chicago.

Pertinent topics to be included in the program are: "Two-Speed Blower Operation," "Our Changing Heating Equipment Markets," "Cooling with Air Movement," "How Best to Help the Dealer Sell," "Air Filtration in Connection with House Dust Allergy," "Our Installation Codes and Various Matters Pertaining to the Same."

The Research Engineering session will present the latest development from that activity and The Elimination of Waste Committee will present its first report.

On Tuesday evening the Chez Paree Night Club will be the scene of a special banquet, and the association's annual Golf Tournament will be held at Olympia Fields Country Club on June 7.

Allen W. Williams, Managing Director.

Florida

The annual convention of the Roofing and Sheet Metal Contractors Association of Florida will be held in St. Petersburg on May 19 and 20 with headquarters at The Suwanee Hotel.

Following registration the convention will be welcomed by J. C. Hughey, president of the Chamber of Commerce of St. Petersburg, to which Frank Tack, president of the association, will respond.

Secretary and Treasurer John T. Stewart of West Palm Beach will report.

In the afternoon a report of a state wide questionnaire on insurance will be made, and The Hon. Wendall C. Heaton, chairman of the Florida Industrial Commission on Workmans Compensation Insurance, will speak.

In the evening the manufacturers and distributors will present a program and entertainment.

Frank Tack, President.

Pennsylvania

The Sheet Metal and Roofing Contractors' Association of Pennsylvania will hold its annual convention at the Brodhead Hotel, Beaver Falls, on June 15 and 16, 1939. The tentative program follows:

Following registration and a Board of Directors meeting the convention will be called to order by W. H. Crowther, chairman, and welcomed by the Mayor for the city of Beaver Falls, to which A. J. Sabathne president Sheet Metal and Roofing Contractors' Association of Pennsylvania, will respond.

E. H. Reismeyer, chairman, will report for the Vocational Education committee.

W. J. Keist, chairman, will report for the Legislative committee.

W. C. Markle, past president of the National Association of Sheet Metal Contractors of the United States, will talk on "What an Association Can Do for Its Members."

There will be an open discussion on "Who Is Your Competition?"

The United States Steel Corporation will present "Steel—

Man Servant," the story of the first complete industrial film ever produced in sound and color.

The Beaver Valley Sheet Metal Contractors Association will be hosts at a Get-together meeting at 8 p. m.

On Friday, following nominations, there will be an address by Carter S. Cole, Engineer, Copper and Brass Research Association on "Copper Roofing" illustrated with lantern slides.

George E. Gwilliam, Manager State Workmen's Insurance Fund will talk on "Workmen's Compensation as It Concerns Our Industry."

R. H. Sommers of Lau Blower Company will address the convention in the afternoon on "Air Conditioning."

R. S. Hahn, chairman, will talk on "Overhead Expense."

M. F. Liebermann, Secretary.

Propeller Fan Manufacturers Association

The National Association of Fan Manufacturers, whose activities cover heating and ventilating, drying and cooling, pneumatic conveying and dust exhaust, and mechanical draft in the power plants, has sponsored the formation of the Propeller Fan Manufacturers Association, with headquarters at 2-255 General Motors Building, Detroit.

M. W. Bauer of the Aerovent Fan Company is president; A. R. Stephen of the DeBothezat Ventilating Equipment Co. is vice president, and V. C. Shetler is secretary and treasurer.

The association is working on a plan to officially adopt a certified rating label.

Chicago

Activities of the Furnace and Sheet Metal Institute, Chicago, were supplemented last month by an interesting talk from Lou Reining, manager of the Chicago office of the Automatic Humidifier Co., and the Institute's annual social night, held at Rhineland Hall, April 22nd.

Cleveland League Officers

The 1939 officers of the Warm-Air-Furnace and Air Conditioning League, Inc., Cleveland, are: President—Robert Thompson; Vice President—J. Bauman; Secretary—Irvine Lewis; Treasurer—R. Lesak; Trustees—Edward Stanek, Elmer Yacksow, Felix Damos, Jack Kennedy.

IRVINE LEWIS, Secretary.

Fan Manufacturers Association

The National Association of Fan Manufacturers at the annual meeting in Buffalo, New York, on April 12, 1939, elected H. Mathis, President; C. T. Morse, Vice President; and L. O. Monroe, Secretary-Treasurer for the ensuing year.

L. O. Monroe, Secy.-Treas.

New York Auxiliary

Paul Andrews of Revere Copper & Brass, Inc., is one of the directors of The Merchandisers Association Auxiliary to New York State Sheet Metal, Roofing & Air Conditioning Contractors Association, Inc.

C. H. Lighthart, Secretary.

For your convenience a number has been assigned each item. Circle the items in which you are interested on the coupon on page 91 and mail to us.

● Indicates product not listed in 1939 Directory.

△ Indicates product and manufacturer not listed in 1939 Directory.

NEW PRODUCTS

65—Furnace Cleaner

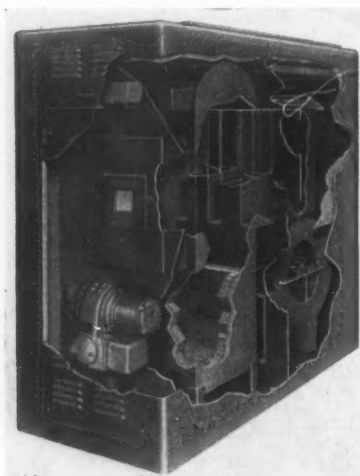
The Breuer Electric Mfg. Co., 5100 N. Ravenswood Ave., Chicago, announces a new low-priced Tornado



furnace cleaner—Model 64-A—complete with attachments. Weighs 23 pounds. 8-gallon tank and large over-size dust-proof bag. This completes a line of three models.

66—Oil Air Conditioner

Premier Furnace Company, Dowagiac, Michigan, announces the RX-8 oil-fired air conditioner—the furnace and radiator of which are shipped fully assembled in a single welded piece.

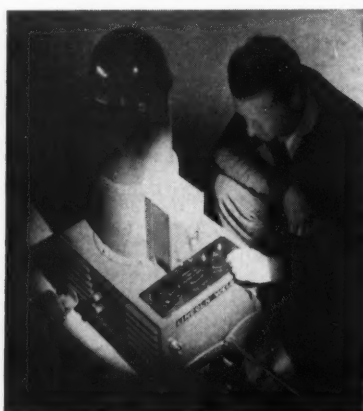


Capacity at 7/10 gal. of oil per hour is 83,000 Btu at the bonnet. Equipment includes furnace, combustion

chamber lining, burner, burner controls, blower, filters, automatic humidifier, draft adjuster, and modern cabinet finished in grey corduroy enamel.

67—Small Arc Welder

The Lincoln Electric Company, 12818 Coit Road, Cleveland, announces

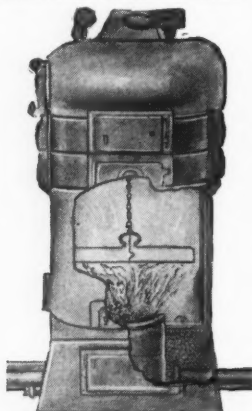


a small motor-generator type arc welder with a self-indicating dual continuous current control.

The SA-150 welder has both job selector and current control calibrated and equipped with dials which indicate the type of work and number of amperes for each setting. The current range is 45 to 200 amperes. It is powered with a Linc-Weld squirrel cage induction type motor, across-the-line starting; 220 or 440 volts; 3 or 2 phase; 60 or 50 cycles, as desired.

△ 68—Stoker Baffle Plates

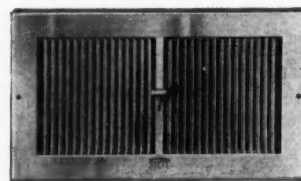
McLeod & Henry Co., Inc., Troy, N. Y., produces steel mixture refractory domestic stoker baffle plates.



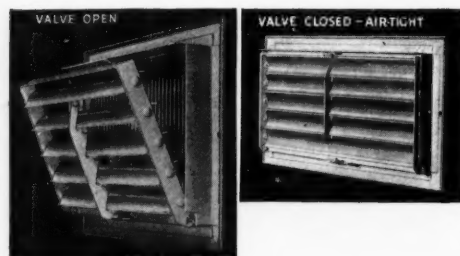
These refractory plates are designed to be suspended over the fuel bed in domestic stoker furnaces, particularly those burning anthracite coal.

69—Turning Blade Valve

Hart & Cooley Manufacturing Co., Holland, Michigan, announces a new "all-purpose" register—No. 86—with adjustable double deflection. The air flow is quickly adjustable up or down



and sideways on the job. There is uniform distribution of air over the entire face, with uniform velocity, negative resistance through elimination



of turbulence. A key for turning regulator is furnished with each register.

Parts are interchangeable. In other words, No. 861 register fits Nos. 2, 3 and 5 frames, permitting great flexibility of stock. No. 864 register fits No. 8 baseboard frame.

70—Metal-Master Snips

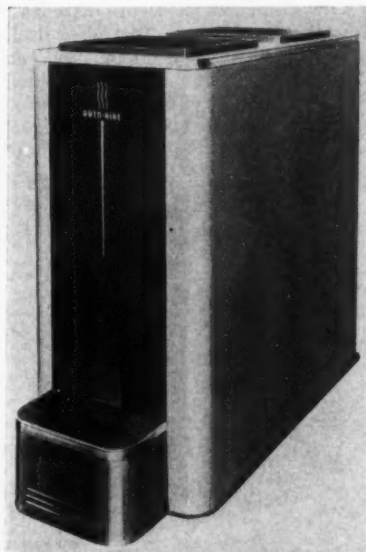
J. Wiss & Sons Co., 33 Littleton Ave., Newark, N. J., announces the new compound-action, Metal-Master



snips, furnished to cut either to left (M-1) or to right (M-2), for cutting circles, squares and irregular patterns on stainless, Dural and Monel metals.

New Products

For your convenience in obtaining information regarding these items, use coupon on page 91.

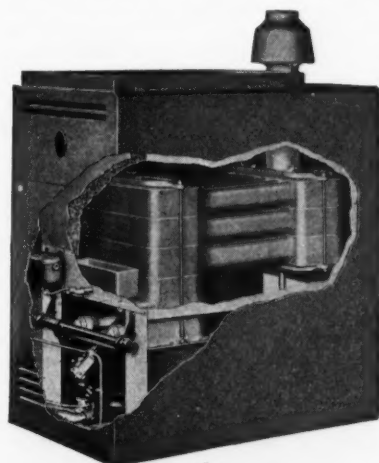


△ 71—Winter Air Conditioner

Auto-Aire Company, 11900 Greiner Ave., Detroit, announces the Auto-Aire unit, a steel, gas or oil-fired winter air conditioner. Eight sizes are available ranging in capacity from 80,000 to 300,000 Btu at the bonnet. Counter flow is employed with the tube type economizer radiator in the return air side.

72—Gravity Gas Furnace

The Bryant Heater Company, 17825 St. Clair Avenue, Cleveland, announces Model CF-55, a cast iron gas-fired,



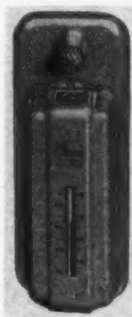
gravity furnace in six sizes, with blue crackle finish jacket, standard gas actuated controls and an automatic pan type humidifier.

The cast iron heat exchanger tubes are assembled in a nearly horizontal position. The warm air outlet is only 50 inches above the floor.

Capacities are 37,500 Btu to 127,500 Btu output.

● 73—Signalling Device

Conco-Sampsel Stoker Corporation, Mendota, Illinois, is building into the thermostat of their Magic Hand Con-

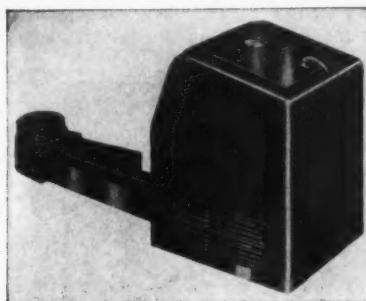


trols the Magic Tell-Tale Finger which lights up when the stoker requires servicing. The system is also adaptable to wiring for an audible signal.

74—Fire-Guard Stoker

The Peerless Manufacturing Corporation, Louisville, Kentucky, announces the Fire-Guard stoker of Peerless manufacture, in a popular size. The hopper holds 300 pounds of coal and its maximum feed capacity is 30 pounds per hour, which will serve in a house of seven to eight rooms.

The new Fire-Guard includes heavy duty, continuous feed automotive type



of transmission, quiet, powerful, self-lubricated; three rates of coal feed; quiet pressure fan mounted direct on motor shaft with elimination of couplings or vibrating parts; compact mounting of rubber-cushioned motor. Automatic air-control; sectional burner; die-formed cabinet construction; easily accessible clean-out; worm drive cut integral with ball-bearing mounted worm shaft; high-quality nickel steel parts, hardened and ground to smooth finish, all operating in a bath of oil. One continuous steel tube from drive unit to retort assures alignment of worm at minimum power required for operation.



● 75—Unit Heatmaker

Iron Fireman Manufacturing Company, 3170 West 106th Street, Cleveland, announces the 1939 Iron Fireman "Unit Heatmaker," which converts fuel into the final form of useful heat. It is a plug-in appliance, designed for urban and rural homes, also for small business structures, which do not have central heating plants.

The Unit Heatmaker is a combination of a hopper-model automatic coal burner, a room-furnace, a forced circulator, and a humidifier.

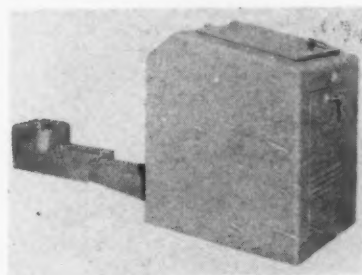
It is styled by Industrial Designer John Gordon Rideout of Cleveland.

An ash receptacle is installed inside the fire door, where it is sealed from the circulated air. The ash and clinker may be drawn over into the receptacle and allowed to cool in it. Fumes pass into the heater.

Hoppers of 200-series will hold 200 pounds of coal, and hoppers of 400-series will hold 350 pounds. Anthracite models are of a "spill-over" ash remover type. A spike-grabber removes foreign objects from coal. A shear-pin is overload protection.

● 76—1939 Premier Stoker

Premier Furnace Company, Dowagiac, Michigan, announces the 1939 Premier stoker, featuring an intermit-



tent feed transmission and complete Premier control system (room thermostat, timer relay and limit switch). The shear pin is accessible, the motor is equipped with an overload switch and the transmission has three speeds easily adjusted by means of a hand lever. The hopper holds 375 lbs.

The 1939 stoker is available in three sizes—25, 35 and 55 lb. per hr.

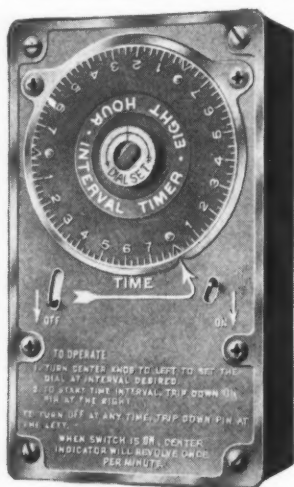
New Products

For your convenience in obtaining information regarding these items, use coupon on page 91.

77—Tork Electric Clocks

The Tork Clock Company, Inc., Mount Vernon, N. Y., announces the 191F and the 191T clocks.

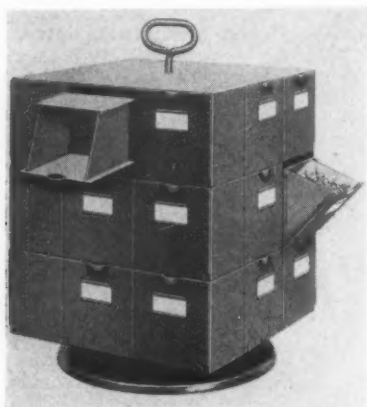
The 191F is designed to fill the need for a time switch which could be located on finished walls. It is finished in soft inlaid colors with chromium high lights. By addition of a border plate, this clock can be mounted flush.



The 191T is an interval timer which does not repeat its cycle. For attic fans or other ventilating equipment to be run a specified length of time, the dial is turned to the number of hours of operation required and the "On" lever is tripped down. When the interval has elapsed, the switch will open.

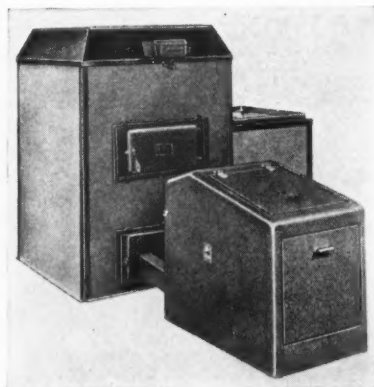
78—Spin-A-Bin

Noggle Products Co., Ann Arbor, Mich., offers a revolving assembly of welded steel bins, in one compact unit—available in a unit containing 24 bins



each 3 x 3 x 2½ in., or 24 bins each 4 x 4 x 3 in. A double width bin may be substituted for any pair of single width bins. A specimen wired to the bin labels each compartment.

Bins are 26 ga. steel, spot welded and finished in green.



79—Stoker Fired Conditioner

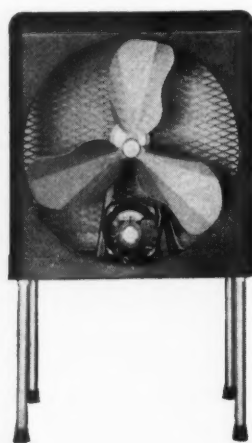
Scott-Newcomb, Inc., 1922 Pine Street, St. Louis, announces a stoker-fired warm air conditioner in seven sizes, from 70,000 to 250,000 Btu, complete with air filters, humidifiers and three-speed blowers.

Bituminous or anthracite stokers are available in either hopper or bin feed types. The anthracite stokers are available in either pit models or several types of ash removal models. The stoker can be installed at front or either side; the blower at either side.

Cooling equipment is available for use in conjunction with this conditioner.

80—Window Cooling Fan

Viking Air Conditioning Corp., Main and Center Sts., N. W., Cleveland, announces a new window model pedestal

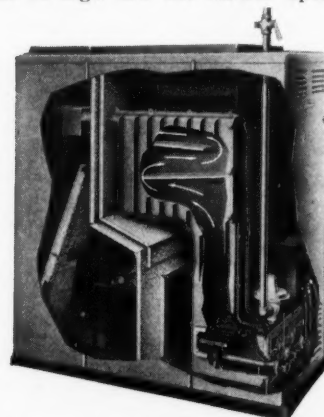


mounted night air cooling fan. A Helixoid impeller fan, 3 blade, 22 in. dia., 700 RPM, 1/6 HP motor, inclosed in a cabinet with adjustable legs, is placed in front of a selected window, and operates on the same principle as attic ventilation. Capacity of fan (free air delivery) is 3,800 cfm.

81—3-Stage Gas Conditioner

Perfection Stove Co., 7609 Platt Ave., Cleveland, O., announces three-stage burners and continuous 24-hour circulation of conditioned air as outstanding features of four new models of the Superfex gas-burning air-conditioning furnace.

"The Superfex system includes a natural gas burner thermostatically controlled to provide high, low, and pilot operation. The two-speed blower is synchronized with the burners so that at high fire the blower operates



at full speed and at low fire and pilot light stages it runs at low speed. The humidifier is equipped with a series of ceramic evaporation plates.

"In case of the failure of electrical power, the furnace can be operated manually, after removing the filters.

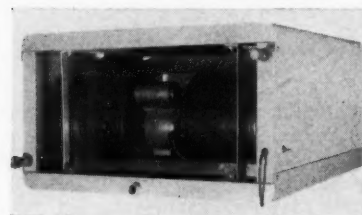
"The heating elements are heavy ribbed cast iron units, built in sections, each having a 40,000 Btu. input, with a separate burner for each section. The header outlet of the sections is constructed of steel, and is located in the return air chamber, thereby pre-heating all the return air. Electric controls and valves are all factory wired and assembled.

"The rectangular casing, with all controls and valves enclosed in a front compartment and with a double-wall section surrounding the combustion units, is attractively designed and paneled, with orange-red and black baked enamel finish and chrome trimmings.

"There are four sizes of the Superfex gas-burning air-conditioning furnace, giving 61,200, 91,800 and 153,000 Btu.'s, respectively, at registers."

82—Comfort Cooler

Premier Furnace Company, Dowagiac, Mich., announces the W-Series comfort cooler (suspended type), avail-



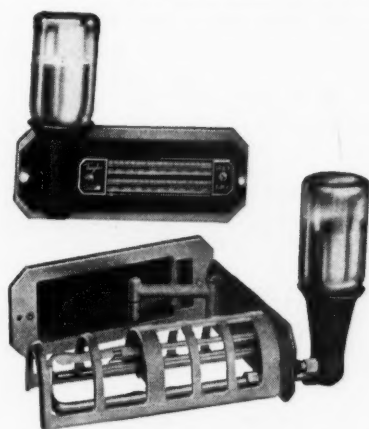
able in 1, 2, 3 and 5-ton models, designed for cooling with low temperature water, wherever water of 60 degree temperature or less is available.

New Products

For your convenience in obtaining information regarding these items, use coupon on page 91.

83—New Hygrometers

Taylor Instrument Companies of Rochester, New York, announce a new instrument in the hygrometer field. The Taylor hygrometer presents a wet-and-dry bulb instrument that com-



bines accuracy and legibility with accessibility. By loosening two thumb screws, the complete assembly swings out on a triple-hinged bracket.

Where a pressure or a vacuum of more than $\frac{1}{2}$ in. of water makes a bottle-fed hygrometer impractical, the Taylor Instrument Companies have designed the Taylor hygrometer with Constant Level Reservoir. This tapped reservoir is adapted for use on any hygrometer; is easy to mount; easy to clean, and is composed entirely of corrosion resistant materials. The space required for installation is only 4x8 in.

84—Sturdybender

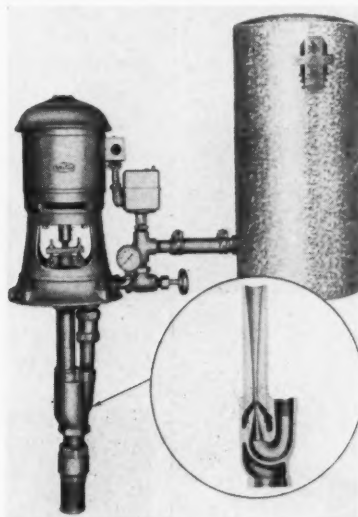
The Steelweld Machinery Sales Division of Cyril Bath & Company, East 70th & Machinery Avenue, Cleveland,



announces a new line of smaller bending presses—the Sturdybender line. Capacities of the new line will be 10 ft. by 10 ga. and lighter, for bending, forming, punching, notching and other serial or separate operations.

85—Westco Jet Pump

Micro-Westco, Inc., Bettendorf, Ia., is incorporating established improvements in the new Westco Jet pump to meet the demand for deep well equipment which can be economically installed and operated. This latest addition to the Westco line provides a selection of $\frac{1}{4}$ to 1 h.p. units, with

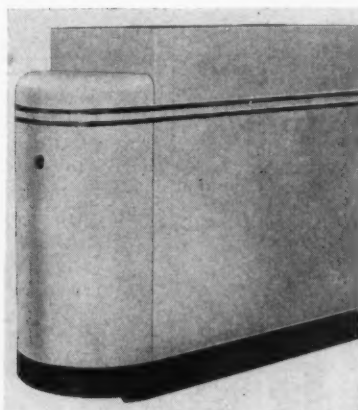


wide-range gallonage capacities for home, farm, resort and industrial plant.

There are no sucker rods or drive shafts used in the Westco Jet pump. This freedom from complicated machinery guards against excessive maintenance, and makes it unnecessary to place the pump directly over the well.

86—Thrift Model Furnace

The George Evans Corporation, Moline, Illinois, announces a 150,000 Btu, Model 15, oil furnace and winter air conditioner.



The No. 15 utilizes the counter flow principle and is equipped with blower, filter, automatic humidifier, controls, and burner.

The casings are finished in Terra Cotta crackle with copper trim.



87—Thermometer Case

Practical Instrument Company, 2717 N. Ashland Avenue, Chicago, is introducing a metal carrying case for their portable recording thermometer for better protection on the job.

88—Low Cost Furnaces

Duo-Therm Division, Motor Wheel Corporation, Lansing, Michigan, announces a new line of low-cost fuel-oil burning Utility furnaces designed to meet small home requirements.

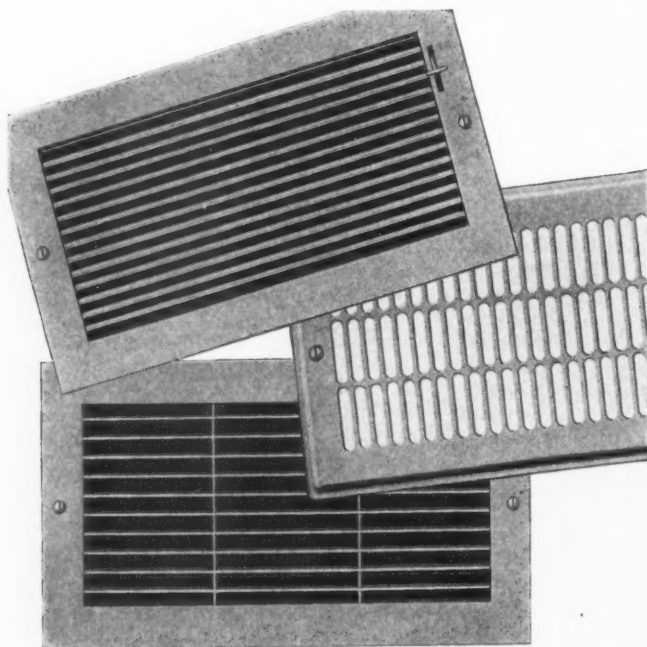
Adaptable to both basement and utility room installations, the new Duo-Therm units are priced within reach of the average 3, 4, or 5-room house.



Available in both manual and thermostatically-controlled models the furnaces are offered in two sizes—50,000 and 75,000 Btu output. All models are equipped with Duo-Therm's bias baffle dual chamber burner, which permits of high-low operation.

Other features include a built in "Waste Stopper" or economizer, double casings, large capacity humidifiers, attractive square type outer cabinets, latest type controls, automatic draft regulators, simple low-cost installation, rigid braced construction details, etc.

When forced circulation is desired two types of units are available. One of these is a low cost package fan which is installed beneath the base of the furnace. The other is a complete filter-blower unit.



Auer has What You Want in REGISTERS and Grilles

For today's air conditioning needs, the accent is on *style* as well as correct heating design. Auer offers many tasteful and inexpensive models for both forced air and gravity uses—better values than ever before. For dependable Registers—depend on Auer.

Write for complete Auer Register Book 39.

THE AUER REGISTER COMPANY
3608 Payne Avenue Cleveland, O.

AUER REGISTERS & GRILLES

For Air Conditioning *and* Gravity

With the Manufacturers . . .

Climatemaker Slide Rule

The slide rule business of the Climatemaker Corporation of Tennessee has been taken over by Climatemaker Slide Rule Service, 205 Griesheim Building, Bloomington, Illinois.

William R. France

Chicago Steel Service Company, Ashland Ave. at 39th St., Chicago, announces the appointment of Wm. R. France as district sales representative in Minnesota with offices in the Plymouth Building, Minneapolis.

Peck, Stow & Wilcox Changes

The Peck, Stow & Wilcox Company, Southington, Connecticut, announces the amalgamation of their machinery and tools and hardware divisions.

W. Roy Moore, for many years vice-president and secretary of the Billings & Spencer Co., is director of sales.

William O. Seifert, formerly manager of the machinery division, is now assistant sales manager.

Floyd J. Neal, formerly manager of the tools and hardware division, is now manager of production.

A. M. Harp Midwestern Sales Manager

American Machine & Metals, Inc., announces the appointment of A. M. Harp as Midwestern district sales manager of the DeBothezat Ventilating Equipment Division, 100 Sixth Avenue, New York, manufacturers of axial flow pressure fans and blowers. He is making his headquarters at the company's Chicago offices, 35 East Wacker Drive.



Winkler stoker distributors and dealers from Illinois (at luncheon) met on April 30 at the Abraham Lincoln Hotel, Springfield, for an all-day sales convention. Herman Winkler, Vice President, and W. C. (Frosty) Winters, assistant sales manager, were the speakers at the afternoon session. S. R. Jones, sales manager, also addressed the gathering. Senator Earl B. Searcy was the principal speaker at the evening banquet.

Winkler stokers are manufactured by the U. S. Machine Corporation of Lebanon, Indiana.

Anthracite at World's Fair

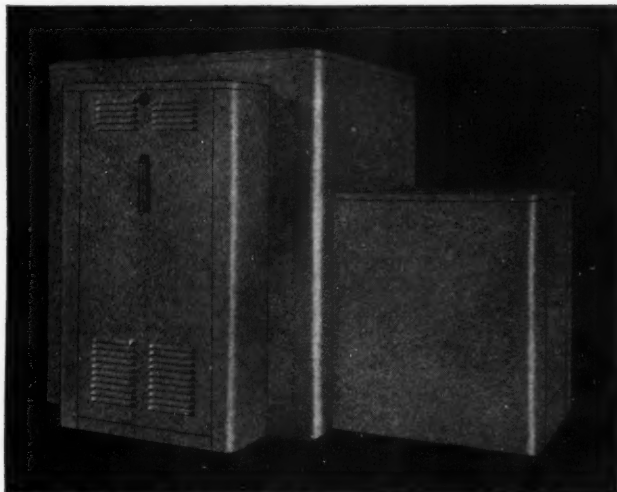
A spontaneous move for public participation in a New York World's Fair exhibit was revealed recently at the Fair Grounds as a group of 96 business and civic leaders from the Pennsylvania Anthracite producing region voted to raise a fund of \$150,000 to augment the fund already contributed by the producing companies through Anthracite Industries, Inc.

Mr. Earnest presided at the meeting and announced plans for organization of "Anthracite Boosters," a region-wide group being formed to cooperate with Anthracite Industries, Inc., in the campaign.

Present plans call for placing Anthracite Exhibits in the Home Materials Building and in the "Town of Tomorrow," both of which have enviable positions on the grounds.

James P. Duffy, assistant to the president of Anthracite Industries, Inc., announced recently that plans have been completed for the continuation of anthracite advertising throughout the winter and spring of 1939. Daily and Sunday newspapers in the entire anthracite burning region, with a total circulation of well over 10,000,000, have been selected to carry the message to the consumer.

Broaden Your Market . . . Lengthen Your Profit With THE ROUND OAK LINE



**OIL MASTER AIRKLENZER A LEADER
IN THE ROUND OAK LINE OF COAL AND
OIL FURNACES AND AIR CONDITIONERS**

Never before has Round Oak offered such a complete line of coal-burning, oil-burning warm air furnaces and air conditioning equipment. Never before have Round Oak dealers been able to extend their sales efforts over such broad furnace markets. Today there is a Round Oak unit to meet every heating requirement and fit every purse . . . for modest cottage or stately mansion . . . for day laborer or high-salaried executive. And this great advancement means increased sales *plus* increased profits.

DEALERS ARE CASHING IN

An independent survey proves that Round Oak furnaces are leaders in consumer preference. And dealers everywhere are cashing in on this preference. Join them today. Take advantage of everything Round Oak has to offer *for your benefit*.

ROUND OAK CO.
DOWAGIAC, MICHIGAN

WRITE FOR LIBERAL FRANCHISE FACTS



THE EXCLUSIVE
CONTRAFLOW OIL BURNER

ROUND OUT
with
ROUND OAK
THE COMPLETE LINE OF
WARM AIR EQUIPMENT



METAPHRAM REGULATORS

for **DURABLE FURNACE
CONTROL AT LOW COST**

METAPHRAM combustion Regulators are self contained and the diaphragm units are the most powerful and durable of any metal diaphragms. Extremely accurate and sensitive, Metaphram Regulators represent the highest development in the regulation of fuel combustion to maintain steam pressures and water or air temperatures within close limits.

SECTIONAL DIAPHRAGM . . . EXCLUSIVE FEATURE

The unusual and exclusive design of the individual diaphragm, or Metaphram, which is made of the highest quality admiralty brass and which gives it its great power and resiliency is responsible for the power and durability of Metaphram Regulators. Sensitive elements in all Metaphram Regulators may be easily replaced in case of damage, eliminating the necessity of replacing entire regulators.



METAPHRAM WARM AIR FURNACE REGULATORS

OPERATE draft and check dampers so as to maintain balance between casing and return air temperatures. Provides safety by preventing excessive furnace temperatures, economy and comfort through elimination of overheating and underheating and labor saving by reducing number of firing periods.

METAPHRAM TANK HEATER REGULATORS

PROVIDE continuous, abundant supply of domestic hot water from coal fired tank heaters. Available in two types, immersion and surface. Mounted on vertical or horizontal pipe line, or on storage tank. Easily installed without draining water system. The lever arm of the surface type regulator is marked so that it may be adjusted for any desired water temperature.

Minneapolis-Honeywell Regulator Co., 2726 4th Ave. S., Minneapolis

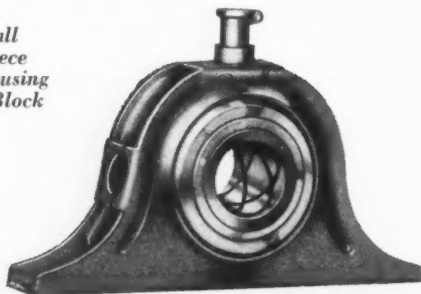
**MINNEAPOLIS
HONEYWELL**
Metaphram Regulators



3 things you can depend on with *Randall* pillow blocks

- 1 Quiet operation with elimination of metallic bearing noises throughout the duct system.
- 2 Long life operation with little or no attention.
- 3 Economical in initial cost and installation.

*Randall
One-Piece
Steel Housing
Pillow Block*



Try Randall Pillow Blocks and learn the value of dependable, trouble-free bearings. Send for new catalog describing the complete Randall line.

Representatives carrying stocks

Tek Bearing Co.
177 Lafayette
New York City

American Stock Gear Co.
100 St. Clair Ave., N. W.
Cleveland, Ohio

C. W. Marwedel
San Francisco
California

Randall GRAPHITE PRODUCTS CORP.
Dept. 511 609 W. Lake St., Chicago, Ill.

With the Manufacturers . .

Copper-Armored Sisal Kraft Stocks

C. G. Hussey & Company, copper and brass manufacturer, Pittsburgh is now carrying complete stocks of Copper-Armored Sisal Kraft in all seven of their warehouses.

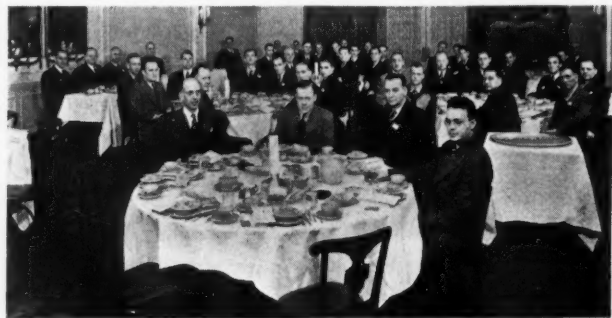
Warehouse in Detroit

R. I. Schuppener, general sales manager, Berger Manufacturing Division, Republic Steel Corporation, Canton, Ohio, announces the opening of a warehouse at 7485 Central Avenue, Detroit.

Blake S. Wright is branch sales manager.

Sales Caravan to Lamneck Plant

Sixty dealers made a pilgrimage from Pittsburgh to the plant of Lamneck Products, Inc., Columbus, Ohio, on April 19 and 20, conducted by J. E. Eckstein, to study the engi-



neering and merchandising phases of the new Lamneck series 700 line of prefabricated duct and fittings, under the direction of W. S. Comers, chief engineer.

Detroit Air Filter

The American Radiator & Standard Sanitary Corporation announces the discontinuance of the manufacture of Arco air filters as of May 1st, 1939.

The machinery, equipment, and materials have all been sold to the Detroit Air Filter Company, who will continue to manufacture the same type of air filter under the name "Detroit Air Filter" at 1330 West Congress, Chicago.

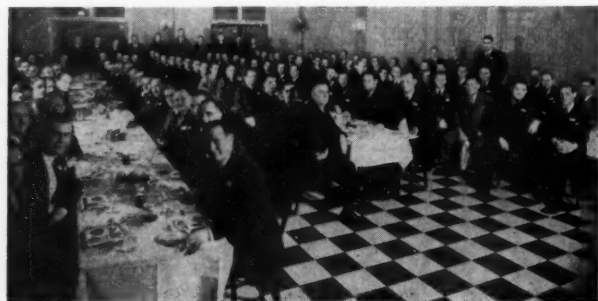
The plant of the Detroit Air Filter Company will be under the supervision of Charles G. Lamb, former manager of the Arco air filter plant. Mr. Lamb announces that the personnel of the former plant will be retained.

The Detroit Lubricator Company, Detroit, will be the sole distributors of "Detroit Air Filters."

Conco Distributor's Convention

Conco-Sampsel Stoker Corporation, Mendota, Illinois, entertained 150 stoker distributors and factory officials at the Hotel Kaskaskia at La Salle, Illinois, for the annual distributors' convention on March 24 and 25.

A preview of advertising and sales promotion was given by Kenneth B. Butler, advertising manager. Chief Engineer



Harold F. Dean explained new developments. Other speakers included W. G. Van Etten, W. S. Michael and M. J. Murray and O. J. Ellingen.

THE MINNEAPOLIS-HONEYWELL
Attic Fan Control
 OPERATES DIRECT ON
Line Voltage

Also Suitable for Window Lighting and Other Timed Switching

THE new M-H attic fan control is not only low priced but requires no relay because it operates direct on line voltage. While primarily designed for attic fans, it is also applicable for store window lights or other electrical equipment where current supply is to be automatically

turned off at a pre-determined time. Capacity is 10 amperes at 110 volts. It is equipped with Con-Tac-Tor Mercury Switch an exclusive feature, making this switch simple, dependable and durable. Minneapolis-Honeywell Regulator Company, 2726 Fourth Ave. S. Minneapolis, Minn.

"Dependable Controls Cost Less Than Service"

MINNEAPOLIS-HONEYWELL
Control Systems



*You're Passing Up
 A Real Bet
 If You Don't Act
 NOW!*

HESS OFFERS YOU A
 COMPLETE LINE
 AND EXCLUSIVE
 TERRITORY

Break down your customers' sales resistance by offering them America's finest welded steel furnaces . . . all sizes up to a million B.T.U. capacity. The Hess line includes blower filter units of unsurpassed quality and performance, also oil burners and stokers to fill every dealer requirement. You'll profit by doing business with one responsible source of supply established since 1873.

Free! Dealer Portfolio
 Complete Details
 and Sales Helps!

**HESS WELDED
 STEEL FURNACE**

An extraordinary furnace; rectangular throughout; firebox lined with 2 1/2" refractory; double casings and many other advantages offering greater efficiency, cleanliness, durability and economy.

HESS WARMING AND VENTILATING CO. 1211-27 S. WESTERN AVE.
 CHICAGO, ILL.
 Established 1873

The LEADERS In the FURNACE PARADE!

HOME COMFORT FURNACE

SERIES G-500

An entirely new furnace added to an already complete line. Developed especially for low cost residential construction.

Fabricated of heavy boiler plate steel, electrically welded throughout, insuring absolutely gas tight construction.



Complete furnace shipped in two pieces, no assembly bolts and nuts necessary on job.

Rectangular casings for this furnace require no bolts, nuts, or sheet metal screws in assembly. Inner liners are automatically set when outer panels are in place.

This high quality furnace is priced to meet all competition, and still insure a greater profit margin.

Investigate the many time and money saving features of this furnace at once
—Be the leader in your community.

Wire or write

**ST. LOUIS
FURNACE
MFG. CO.
ST. LOUIS
MO.**

New Literature

For your convenience in obtaining copies of Literature, use the coupon on page 91.

136—Sleep in Cool Comfort

The Allen Corporation, 9751 Erwin Avenue, Detroit, is distributing a 12-page folder illustrating and describing their new and improved 1939 attic fan. Fan data on the eight standard sizes are included.

137—Refrigeration Products

Merchant & Evans Co., 2035 Washington Avenue, Philadelphia, is distributing a 40-page catalog of their electric compressors, followed by capacity tables for the air- and water-cooled units, using various refrigerants.

138—Water Heaters

The Hotstream Heater Co., 8007 Grand Avenue, Cleveland, is distributing Illustrated Price Catalog No. 39, covering their hot water heaters, including domestic sizes, using gas, electricity, gasoline, and kerosene as fuel. Tables are included to help select the proper size heater for hotels, restaurants, apartments and offices.

139—Eyeshields

Jackson Electrode Holder Co., 15122 Mack Avenue, Detroit, makers of industrial safety equipment, is distributing a folder illustrating and describing the Jackson eyeshields for workmen engaged in soldering, flash, gun and spot welding operations, and for general eye protection in industrial plants. Various types and styles are available in clear, smoked, lemon amber, light green and dark green.

140—Copper-Armored SisalKraft

The Sisalkraft Co., 205 W. Wacker Drive, Chicago, is distributing a folder with three samples of copper-armored SisalKraft in 1, 2 and 3-oz. weight—thin sheets of electro deposit Anaconda copper reinforced with 24 crossed Sisal fibers per square inch, bonded with special asphalt, under heat and pressure, to a 30-lb. creped kraft paper. It is flexible, easy to handle, and the makers say will not kink, crack or tear. Construction details show the various uses.

141—Catalog K

Julien P. Friez & Sons, Baltimore, announces its new 1939 Catalog K. This attractive 24-page booklet (8½x11) features the latest controlling, measuring, and recording instruments, and completely covers the automatic heating, refrigerating and air conditioning industries. Highlights are the new reduced prices, "Hydraulic-Action" controls, new Deluxe humidistats and thermostats, Snap- and Slow-Acting gas valves, and stoker control sets.

142—Attic Fan Sales Kit

Viking Air Conditioning Corporation, Main and Center Sts., N. W., Cleveland, is distributing a sales kit containing: 1—a 16-page attic fan manual—with data on principles of attic ventilation, information and installation instructions for the Viking CirCOOLator attic fan; 2—proofs of newspaper advertisements; 3—commercial ventilation folder; 4—a description of other Viking folders and sales materials; and 5—dealer price lists and order blank.

143—The Story of Air Conditioning

Air Conditioning Manufacturers' Association, Southern Building, Washington, D. C., has just announced a new 12-page booklet which tells "The Story of Air Conditioning" in an instructive and entertaining manner. Illustrated in the Disney cartoon style, the booklet creates four hypothetical characters—Tumpy, Dippy, Dusty, and Stirry—to personify temperature, humidity, cleanliness, and air motion, respectively, the four elements to be controlled in air conditioning. Personality sketches of these characters, and a graphic description of their treatment in an air conditioning system, serve to simplify an ordinarily complex subject. Copies are available.



RIVER TERRACE—WASHINGTON, D. C.

A 700 Home Project and hundreds of other production builders thru-out the East are using CALESCO'S AIR CONDITIONING EQUIPMENT.

There must be a reason.

WRITE

WHY?

CALESCO CORP. • LYNN, MASS.



“Me Sell BREEZ-AIR Attic Fans?”
“Certainly, It’s a Natural for
Every Sheet Metal Contractor!”

Sheet metal contractors, experienced in the installation of residential duct work, find the installation of Breez-Air Attic Fans a simple job. Grilles, penthouses, louvers—all are easily handled by men trained to install heating equipment.

Here, then is an opportunity for double profit—your fan profit, your installation profit. Now is the time to sell these installations. Our complete plan makes it easy for you to get into this profitable business.

Valuable Territory Open

Write or wire us today for complete information.

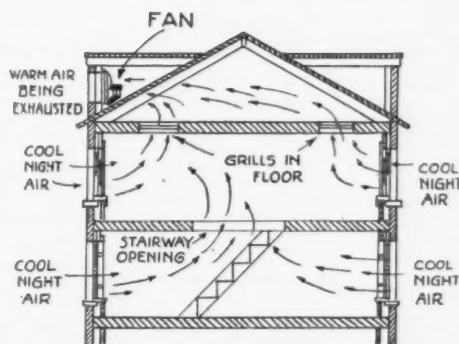
BUFFALO FORGE COMPANY

497 BROADWAY

BUFFALO, N. Y.

Branch Engineering Offices in Principal Cities

Canadian Blower & Forge Co., Ltd., Kitchener, Ont.



Home Comfort Cooling at a Glance

**Easy Profits in
Ready Market
FOR HOME COOLING EQUIPMENT!**

Sell LAU NITEAIR ATTIC FANS

*It's a beauty!
Fan is encased in
two-tone crackle-
finish housing. De-
sign is modern
and appealing. A
"sure bet" in ap-
pearance.*



● You'll get your full share of summer cooling business with Lau NITEAIR ATTIC FANS. They have eye appeal *plus* price appeal . . . a combination certain to make your attic fan sales volume grow faster.

Lau NITEAIR uses cooling principles based on scientifically directed air movement. It is efficient . . . already completely constructed . . . easy to install. Homes . . . stores . . . factories . . . hotels . . . clubs . . . all are prospects for NITEAIR!

Liberal dealer discounts add to your profits. Actively promote NITEAIR now for increased summer sales.

See These NITEAIR Features

Other LAU Products

Lau also makes
Furnace Blower
Assemblies, Pil-
low Blocks, Pul-
ley Wheels,
Blower Hous-
ings, Blower
Wheels.

- A complete range of sizes—30" to 48"
- Capacities from 7,500 to 20,000 cubic feet per minute
- Fire proof, all-metal housing and vent box
- Practically noiseless. Rubber mountings between unit and floor, on motor and bearing mountings
- Housing sprayed with special sound deadening material
- Package unit, complete with accessories—or as a fan unit—or as fan with front grille for public view.

Mail the coupon today for dealer plan and complete information on NITEAIR ATTIC FANS.

The LAU BLOWER CO., 934 E. Monument Avenue,
Dayton, Ohio

Gentlemen: Please send me descriptive literature, list of sizes,
performance data, and prices of the NITEAIR ATTIC FAN.

Name

Street

City State.....

New Literature

For your convenience in obtaining copies of new Literature, use the coupon on page 91.

144—"Home Comfort" Catalog

The St. Louis Furnace Mfg. Co., 2901 Elliot Ave., St. Louis, announces their 1939 catalogue covering the complete line of warm air heating and air conditioning equipment for hand firing, as well as stoker firing, oil burning and gas burning equipment.

145—Special Model JM

Electrol Incorporated, 934 Main Avenue, Clifton, N. J., is distributing a new folder covering the Electrol Special Model JM oil burner, with capacities of 1-2½, and 2-8 gallons per hour.

146—N. Y. World's Fair Map

David Levow, 308 West 20th St., New York City, is distributing to roofers and sheet metal workers a New York World's Fair map showing automobile routes and also rapid transit routes to the World's fair exhibits and points of interest.

147—Precision Measuring Tools

George Scherr Co., Inc., 128 Lafayette St., New York City, is distributing a spirally bound catalog of mechanics' tools—Mauser Vernier Calipers, knife-edge straight edge, leveling square, Chronometric speed indicator, and automatic saw sharpener.

148—Rainseal and Galvanized Sheets

Reeves Steel & Manufacturing Co., Dover, Ohio, is distributing a small folder illustrating and describing their Rainseal—double channel, non-syphon roofing—in 29, 28 and 26 gauges any length to and including 12 feet. Each sheet covers 24 inches in width. Instructions for application are included.

Another folder covers Reeves galvanized sheets.

149—24-Hour Air Conditioning

Perfection Stove Company, Inc., 7609 Platt Avenue, Cleveland, is distributing 12-page catalogs covering their gas and oil-burning Superfex furnaces. There are three models of oil burning furnaces—85,000, 120,000 and 150,000 Btu at the registers—in a choice of orange-red and black enameled casing or plain black baked enamel. There are four gas-burning models—61,200, 91,800, 122,400 and 153,000 Btu at the register—in the same choice of finishes.

150—Enjoy Cool Comfort

Air Controls, Inc., Div. of The Cleveland Heater Co., 1933 West 14th St., Cleveland, is distributing a booklet entitled "Enjoy Cool Comfort in Your Home This Economical Way!"—a presentation manual which the retail salesman can use to help interest home owners and business men in summer comfort provided by air circulating equipment. It explains with text and illustrations how an attic ventilation system provides comfort and then outlines the advantages. Price 15c a copy.

151—New Basement Modernization Book

The Bryant Heater Company, 17825 St. Clair Ave., Cleveland, has prepared "Three Keys to the Modern Basement" a 20-page, illustrated book on modernizing the basement. The suggestions are practical and easy to follow in transforming the basement into a livable and attractive room. The three keys: where to begin . . . what to do . . . and how to do it, "unlock your basement for greater usefulness." Building furniture and games, the treatment of floors, doors, and windows, making stairways attractive, and many other helpful suggestions are incorporated in this book which is dedicated to the Homeowners of America. Price 10c.



**HAPPY? SURE
NOW THAT I
HAVE CONFI-
DENCE IN THE
FURNACES I
SELL!**

... WHY NOT LET THE
Comfortzone LINE
DO THE SAME FOR YOU?

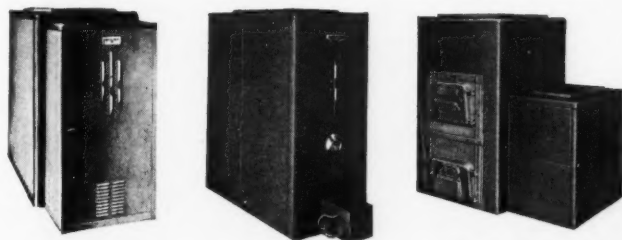


You too can have confidence in the furnaces you sell if you handle the Comfortzone line, because: First, through their moderate prices you can meet all competition in either the oil, gas or coal (hand or stoker fired) jobs.

Second, their construction is of the highest quality and each type of Comfortzone furnace (whether it is oil, gas or coal fired) is designed to give the utmost in heating efficiency, and this is the reason you save on costly service calls that result in dissatisfied owners. Third, the organization behind the Comfortzone line, the Michigan Tank & Furnace Corporation, will cooperate at all times on your sales and installation problems, also through their large manufacturing facilities you are assured of prompt deliveries on all orders, whether it is one furnace or a carload.

Why not get all the information right now on the Comfortzone line, and find out how your profits will grow when you handle a line that gives you confidence to sell "all the jobs" because its units are priced right, to sell the volume market.

Your Profit Line for '39



OIL • GAS • COAL

The above illustrations give you an idea of the neat compact appearance of the Comfortzone units. The oil or gas jobs are completely automatic winter air conditioning units, of green crinkle finish, while the coal units can be had in either the round or square casing with winter air conditioning if desired.

**WRITE US
TODAY
FOR
LITERATURE**

MICHIGAN TANK & FURNACE CORP.
14101 PRAIRIE AVE. • DETROIT, MICH.

ARE YOU STILL A
**"GUINEA
PIG?"**



**GET WISE—GET OUT OF THE
"Cheap" STOKER CLASS**

If you're still serving as a "proving ground" for untested stokers—or if you're absorbing the cost of service troubles on a "cheap" line of stokers—get wise to yourself and graduate to Econ-O-Col!

For here is a stoker that's *tried* and *proven* (no transmission replacements in over four heating seasons!) Here is a stoker that's made UP to a standard, not down to a PRICE. And here's a stoker that will perform like a thoroughbred with a minimum of service calls—meaning highly satisfied customers, more NET PROFITS for you.

Right now plans are in the making for the biggest stoker year in Econ-O-Col history—including a complete line of 22 money-making models, "horse-sense" dealer helps, and factory sales and advertising cooperation of the sort you've dreamed about. Write, wire or phone today for complete details!

ECONOCOL
COAL BURNER

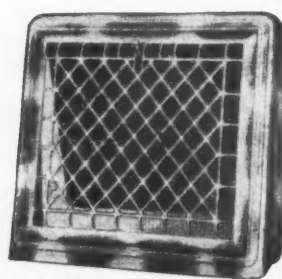
ECON-O-COL



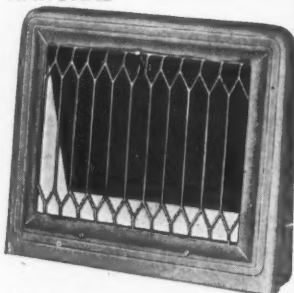
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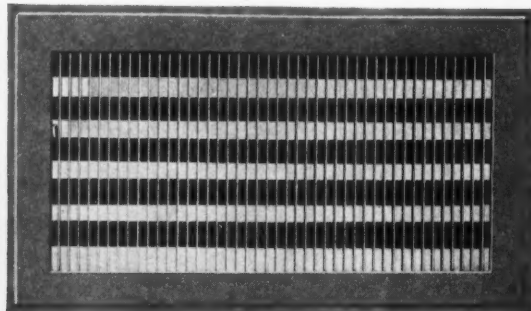
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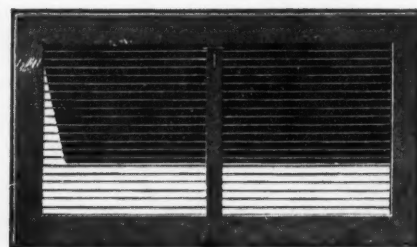


Now you can keep your register costs down to practical levels and still protect your customers from unclean finished installations and soiled ceilings. In even the Lowest Priced U. S. Registers there is no compromise with quality. Whether it's a highly competitive gravity job or a deluxe air-conditioning installation, U. S. can provide you with registers and grilles that will keep up the reputation of your organization for quality work.

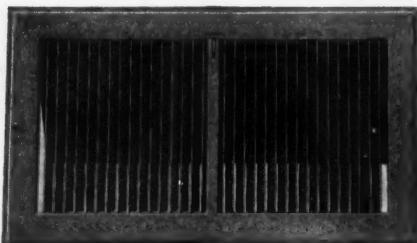


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Style 153—This is typical of the U. S. close-space louver-type registers which come in straight, horizontal-flow or 22° and 45° down-flow and are also furnished in vertical flows, left and right, and multi-flow.



Style 140—One-piece sidewall. Bars adjust to 45° right or left flow without marring register finish.

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Blower may be put on either side, right or left. An addition to complete International Cast Iron line of Gravity and Winter Air Conditioners

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152—1939 Milcor Price List

Milcor Steel Company, Milwaukee, Wisconsin, announces the new 1939 Milcor Price List, just off the press. There are 81 pages portraying Kuehn's square and half round gutter, Milcor Airtite heaters, Solid Partition system, and the Milcor Hollow Partition system. Increased service and manufacturing facilities are pictured on the back cover which shows the nine plants and branches.

153—The Built-Up Roof

American Roofer, 425 Fourth Avenue, New York City, is offering "The Built-Up Roof"—80 pages and 80 illustrations in paper binding. Price \$1.00.

The Built-Up Roof is described, and there are chapters on equipment and materials, the roof crew, hotstuff and heating, preparing the deck, applying the roof, flashing, insulation, reroofing and repairs, blisters, estimating costs, preventing accidents, and pitfalls to avoid.

The book is edited by Bernard Sachs.

154—Catalog No. 27—1939 Edition

United States Register Co., Battle Creek, Mich., is distributing Register Catalog No. 27—152 pages, in spiral binding—describing warm air registers, air conditioning registers, vents and grilles. New lines of Multi-Louver back registers, lever operated as well as with individually set blades, are shown. Floor registers and faces are designated by style numbers, as are also lock-type and key-lock registers, adjustable ceiling ventilators and duplex pipeless furnace gratings.

155—Metals and Metal Products

The J. M. & L. A. Osborn Company, 1541 East 38th Street, Cleveland, is distributing Book No. 39 covering their Golden Star brand "Metals & Metal Products." This book is divided into thirteen sections: 1—tin and terne products; 2—aluminum, copper, zinc, lead, stainless, plated sheets; 3—galvanized, hot and cold rolled, special finish sheets; 4—angles, bands and bars, perforated metal sheets; 5—steel ceiling, ventilators, chimney caps and tops; 6—trough, gutter, conductor pipe, ridge roll, accessories; 7—asbestos and asphalt roofing, canvas, paints, accessories; 8—wire, nails, rivets, bolts, sheet metal screws; 9—furnaces, pipe and fittings, registers, ventilating fans; 10—stove pipe and accessories; 11—solder and accessories, miscellaneous products; 12—tools and machinery; 13—plumbing supplies. Tables are included and the catalog is carefully indexed.

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72	73	74	75	76	77	78
79	80	81	82	83	84	85
86	87	88				

136	137	138	139	140	141	142
143	144	145	146	147	148	149
150	151	152	153	154	155	

Name Title

Company

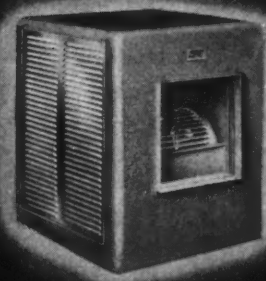
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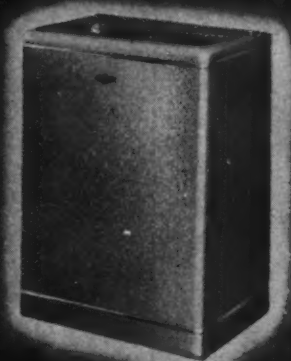
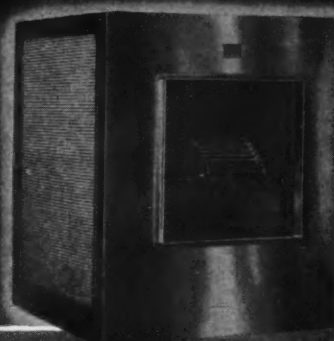
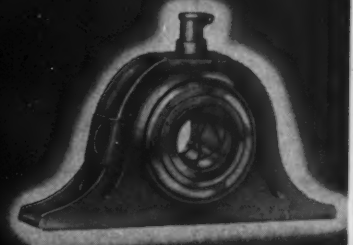
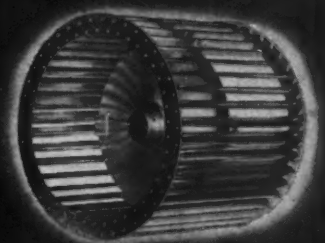


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- Utility dynamically balanced centrifugal blowers.
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- Randall graphite pillow blocks
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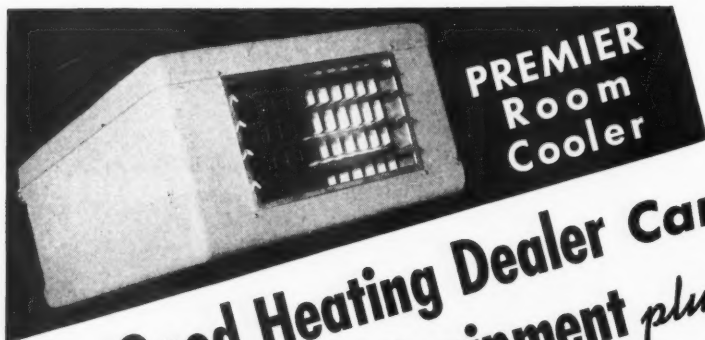
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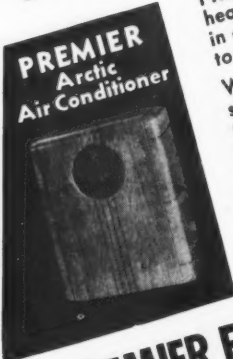
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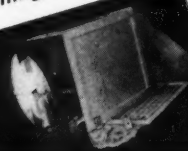
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Grinding and Polishing Stainless Steel

(Continued from page 61)

Mixing

Mix by weight only and never heat more than a three-hours' supply at any time. For average conditions in the polishing room the following table of mixtures should act as a guide for setting up wheels:

SIZE OF GRAIN	PER CENT GLUE	PER CENT WATER
24-36	50	50
46-54	45	55
60-70	40	60
80-90	35	65
100-120	33	67
150-180	30	70
220-240	25	75

Soaking

Soaking the glue allows it to dissolve more readily on heating. Use cold pure water and soak:

Ground glue	One hour or more
Flake glue	Six hours or more
Cake glue	Twelve hours or more

Melting of Glue

The glue should be melted in a water jacketed heater. When the wheels and grain are preheated, apply the glue at a temperature of 140° F. With wheels and grain at room temperature, use glue at 160° F. Keep a thermometer in the glue pot as a constant check on temperature, even though the pot is regulated by a thermostat.

It is important that all equipment used be kept clean.

Kruckman's Washington Letter

(Continued from page 36)

net profit each year to pay off the loan within six years, and that his assets were more than sufficient to cover the loan in the event that he could not pay off. The loan was made. It would have been made, in this instance, if the borrower had been able to produce assets totalling only \$7,000.

Character Important

The RGC explained, in connection with this instance, that it is not necessary for an applicant to show a profit during the last year of operation. The determining factors are local good standing, reasonable probability that the loan will expand the business sufficiently to allow a net profit to pay off the debt, and character. Character gets the loan in borderline cases. If the local bank will participate on the most nominal basis, 5% or even 3% of the total, it greatly facilitates the transaction.

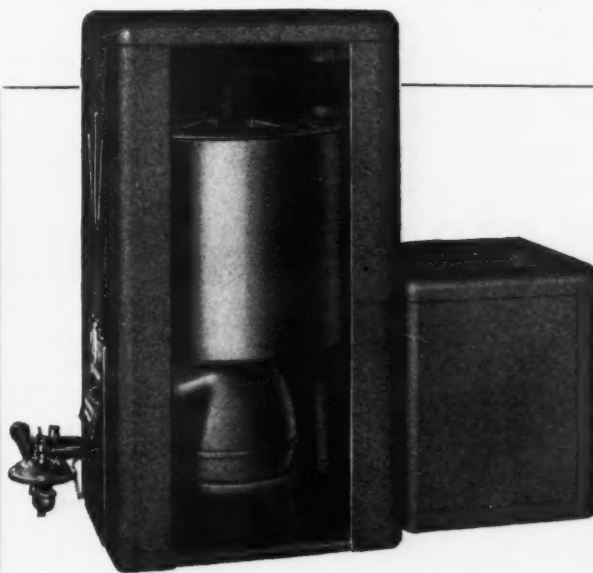
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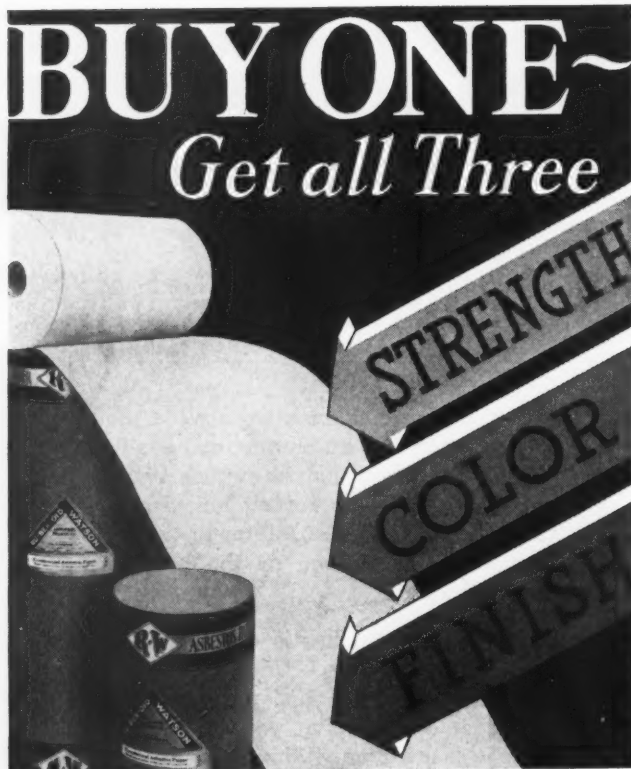
True air conditioning is at its best in this excellent model. Well designed to give the utmost in efficiency and performance it will give you a decided edge on the competition and enable you to build up a business that will repay you handsomely.

Drop a postcard in the mail today for literature on the complete WISE line ... we'll send it to you at once.



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FREE THIS CANISTER CONTAINING
5 foot Sample

Konzo-Factors Affecting Cooling Load

(Continued from page 44)

ing load is based on the assumption that the changes in load occur at the same time that changes occur in the outdoor temperature and sun effect. For example if the temperature difference between the outdoors and indoors is 20 deg. F. at a given time, the heat transmission through the wall at that time is calculated on the basis that conditions of thermal equilibrium have been maintained with this 20 deg. F. difference and the existing sun effect. The full line curves in Fig. 5 show hourly values of ten component items of heat gain without allowance for a time lag.

A second method for calculating the cooling load attempts to allow for the time lag in the transmission of heat through the walls and ceiling. In this case the calculations are based, not on the temperature difference and sun effect occurring at the given time, but on those that existed at some previous time. The broken line curves in Fig. 5 show that time lags were assumed of two hours for the uninsulated walls (Items 1 and 2) and three hours for the uninsulated ceiling (Item 5). These values were obtained from actual temperature measurements made on the wall and ceiling of the Research Residence.

In the case of the Residence, in which no insulation was used in walls or ceilings, the more complicated method of calculation allowing for time lag did not materially change the maximum calculated heat gain. Hence in the case of frame structures similar to the Residence the more complicated method is hardly justified.

However, the lag that exists between the time that a temperature differential is imposed on a wall and the time that the inside surface temperature is affected is dependent on the type of construction, the density, the specific heat of the materials, and the conductivity

TABLE 4

APPROXIMATE TIME LAGS

(Data from paper by F. C. Houghten, Carl Gutberlet, and A. A. Rosenberg of the A.S.H.V.E. Laboratories).

Construction	Approx. Time Lag* in hours	U	Heat Capacity Density x Spec. Heat Thickness in ft.
1. Slag covered roof.....	0.5	0.293	2.91
2. 2 inch pine.....	0.5	0.265	3.14
3. ½ inch Insul. board on each side of 2x4 stud with blanket fill insul.	1.	0.06	0.85
4. Shingles, sheathing, 2x4 stud, cabots' quilt, insul. lath and plaster	2.	0.13	2.50
5. 2 inch iron and cork.....	2.	0.135	2.50
6. 4 inch gypsum	2.	0.278	5.30
7. 3 inch concrete, tin, cork....	2.	0.242	7.58
8. 1 inch cork, 3 in. concrete...	2.	0.242	7.58
9. 6 inch concrete	2.	0.682	17.62
10. 4 inch iron and cork.....	9.	0.135	11.25
11. Cinder fill roof.....	9.	0.161	11.24
12. 13 inch brick.....	10.	0.288	25.55
13. 8 inch iron and cork.....	16.	0.135	29.6

*These values of time lag were estimated by the writer from the original data and are approximate values only.

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TO DRILL IN TOUGHEST
STAINLESS STEEL with
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HIGH TORQUE
SKILSAW DRILLS**



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*Your neighbors...
the butcher...
the baker...
the undertaker...*

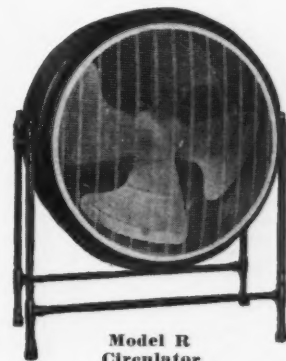
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of the wall. A massive wall that is well insulated, for example, will show a greater time lag than a lighter wall that is not as well insulated. Preliminary results obtained in the Residence indicate that a wall completely filled with fill insulation will have a time lag of approximately five or six hours instead of two hours for the uninsulated wall.

The approximate time lags for thirteen different types of construction were estimated by the Writer from data submitted by F. C. Houghten and his colleagues of the A.S.H.V.E. Research Laboratory. As a very rough approximation the writer suggests the following formula for establishing the time lag of any construction: (See Table 4)

$$\text{Time Lag in hours} = \frac{\text{Heat capacity}}{12 \times U}$$

in which,

U = overall coefficient of heat transmission in B.t.u. per hr. per sq. ft. per deg. F. from inside air to outside air.

Heat Capacity is in terms of B.t.u. per sq. ft. per deg. F. The numerical value is equal to:

$$\left(\frac{\text{density in lb. per cu. ft.}}{\text{Thickness in feet}} \right) \left(\frac{\text{specific heat in B.t.u. per lb. per deg.}}{\text{Thickness in feet}} \right)$$

In order to calculate the heat transmission, including this time lag, it is necessary to determine the manner in which the outdoor temperature varies with the time of day. For example, if the calculated heat gain is to be determined for 2 p. m., and a time lag of 6 hours is assumed for the wall, then the temperature difference existing at 6 hours prior to 2 p. m., or 8 a. m. should be used in the calculations for the heat gain through the walls. The writer has indicated in Table 5 the relative temperature differences existing at various hours of the day in terms of the maximum difference at 2 p. m. These average values were determined from the top curve in Fig. 5. Hence in the preceding example for a time lag of six hours, the temperature difference on the wall at 8 a. m. would be approximately 37 per cent of that existing at 2 p. m. Therefore, if the maximum temperature difference assumed for design purposes is 95—78 or 17 deg. at 2 p. m., the temperature difference at 8 a. m. would be approximately 0.37×17 or 6 deg. F. It may be noted from Table 5 that for constructions in which the time lag exceeds three hours, a material reduction in the calculated heat gain is effected. As more data become available it is probable that greater attention will be paid this factor of time lag particularly for walls having both a high "heat capacity" and a low coefficient of heat transmission. By neglecting time lag in the calculations for heat gain, the values will be on the safe side and the plant have some reserve capacity.

Heat Absorbed by Structure

The tests made in the Research Residence indicated



The BEST Humidifying Job and the EASIEST for You

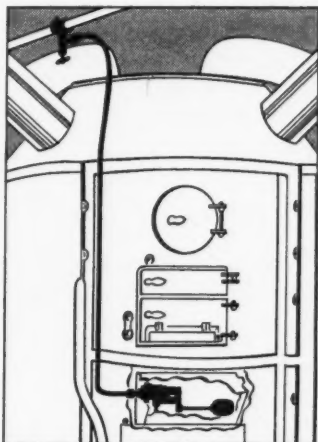
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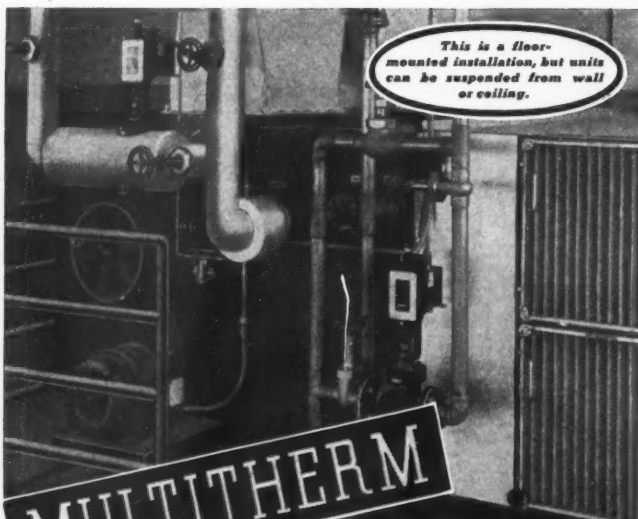
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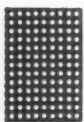
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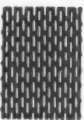
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TABLE 5

APPROXIMATE TEMPERATURE DIFFERENCES FOR
VARIOUS TIMES OF DAY*

Time of day	Ratio of Temp. diff. at hr. des- ignated to that at 2 p. m.
4 a. m.	0.00
6 a. m.	0.08
8 a. m.	0.37
10 a. m.	0.71
11 a. m.	0.83
Noon	0.87
1 p. m.	0.92
2 p. m.	1.00
3 p. m.	1.00
4 p. m.	0.96
5 p. m.	0.92
6 p. m.	0.83
8 p. m.	0.62
10 p. m.	0.37
Mid.	0.21
2 a. m.	0.12

*These values determined by writer from outdoor temperature curves in Fig. 5.

that when the operation of the cooling plant was begun, the rate at which the air temperatures in the house decreased was exceedingly small, even when the actual plant capacity was greatly in excess of the cooling load at that time. Furthermore, it was found that with insufficient plant capacity, the rate of rise of the air temperatures was also small. These low rates of change in air temperatures have been attributed to heat absorbed and given up by the building structure and furniture.

Heat Absorption of Research Residence

Calculations made for the Residence indicate that the heat absorbed or given up by the Residence was 12,180 B.t.u. on the first story and 12,160 B.t.u. on the second story, or a total of 24,340 B.t.u. for one degree change in indoor air temperature. "These values are for the building structure alone, and do not include an allowance for the heat that could be absorbed by the furniture, floor coverings, light fixtures, books, and equipment. Therefore, an actual change of 1 deg. F. in the indoor air temperature is representative of a very large heat exchange. If the indoor air temperature were reduced 1 deg. F. a large amount of heat would be given up to the air by the structure, and would represent a large additional load on the plant. Conversely, if the indoor air temperature rose 1 deg. F. the heat absorbed by the walls would tend to relieve the plant. For example, if the indoor air temperature changes 1.5 deg. F. during a four-hour period, the rate at which heat is being absorbed or given up by the structure will be greater than 9000 B.t.u. per hr. The latter is equivalent to $\frac{3}{4}$ ton of refrigeration capacity during the four-hour period.

Structural Absorption Permits Undersized Equipment

"These results serve to explain why it is possible to use a plant considerably smaller than that demanded by the calculated maximum cooling load, and still main-

BENDING
BRAKES

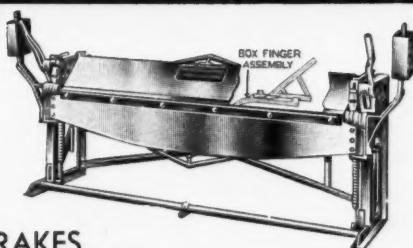
WHITNEY-JENSEN

METAL
TOOLS

25 YEARS



SHEET
METAL
TOOLS



BENDING BRAKES

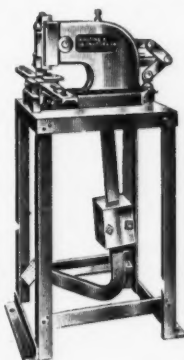
Selection ranges from 49 in. 20 ga. portable type to 10 ft. 12 ga. combination type . . . features include quick-change box fingers, roller bearings for easy operation, etc.

FOOT PRESSES

Four sizes available (7", 10", 18", and 24" throat depth). Capacity 2" hole in 16 ga. iron, 100 holes per minute. Ideal for light production work.



CATALOG
Be sure you have the Whitney-Jensen 92-page Catalog No. 12 covering over 80 useful metal - working tools and machines.



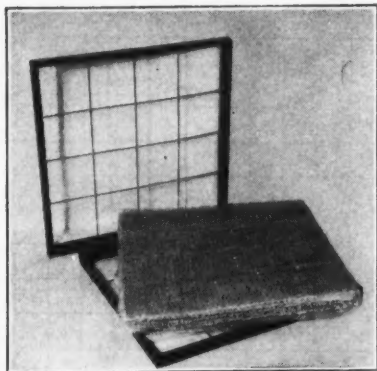
SUPER-EDGER

Turns a 90° flange up to 16 ga. with power-driven hammer action . . . flowing the metal to shape, not crimping. Smooth, fast, accurate, self-starting, takes practically any shape.

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RESEARCH PRODUCTS CORPORATION

Re - Fil - Able "WALTON" AIR FILTERS



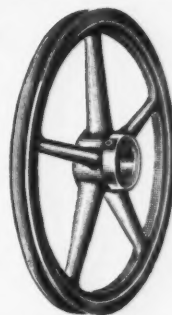
This new Research Products Corporation Re-Fil-Able "Walton" Air Filter consists of a permanent steel frame with a removable cover and replaceable trisection filter, and functions with the highest degree of efficiency. It also gives you the opportunity to pass on to your customers a saving of approximately one-third of their filter bills, as Research Products Corporation Re-Fil-Able "Walton" Air Filter features save that much in the course of time.

Write for full information at once.

RESEARCH PRODUCTS CORP.
MADISON WISCONSIN

MAUREY V-PULLEYS Serve Best Where DEPENDABILITY Counts Most

THE New MAUREY Cast Iron V-Pulley will be found particularly efficient when used with Blowers and Air Conditioning Equipment. Tests prove that its new scientific design—five specially shaped spokes—give less resistance to the flow of air in these installations than the ordinary pulley. It is exceptionally sturdy, well balanced and true running. Available in seven sizes—7.2" to 14.2" O. D.



Cast Iron

MAUREY Steel V-Pulleys are well known for their trouble-free service with F. H. P. installations in Stokers, Fans, Air Conditioning and Refrigeration Units.

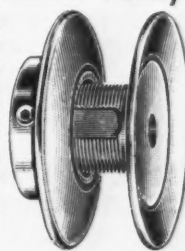
Made of STEEL with heavy rolled edges giving extra sturdiness. Hubs are machined steel or malleable iron, not die cast. Carried in stock in a wide variety of sizes for both "A" and "B" belts.

WRITE FOR CIRCULARS GIVING PRICES AND DESCRIPTIONS.

MAUREY Variable Pitch Diameter Pulleys



Solid steel construction. Adjustment permits speed variation of as much as 30%. Fine, accurate, milled threads, 20 to the inch, assure close adjustment. Designed for Air Conditioning Units. Solid steel—not die cast. Made in 4 sizes, 3/4" to 4 1/2 inches in diameter.



MAUREY MANUFACTURING CORP.
Wabash at 29th, Chicago, Illinois

TESTED AND PROVEN



No Master product is ever made available until it has been thoroughly tested and proven to be worthy to bear the Master name. The model B-22 has proven its dependability not only in our exhaustive tests, but in use under actual operating conditions in the many years it has been sold and installed all over the country.

TYPE B-22

A two position heat regulator that is ideal for the small home. It is sturdily made and dependability and precision are built right into it. A noiseless device that will outlast the heating plant.

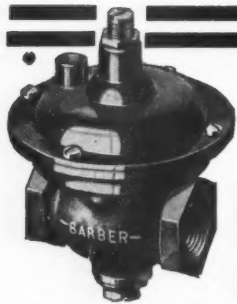
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2362 University Ave. St. Paul, Minn.
New Low Prices. Write for Details.



Made by the makers of the famous Type B-144, the original gradual control heat regulator.

MASTER

TEMPERATURE CONTROLS



Made in $\frac{3}{4}$ ", $\frac{3}{8}$ ", $\frac{1}{2}$ ",
 $\frac{3}{4}$ ", 1", $1\frac{1}{4}$ ", $1\frac{1}{2}$ ",
and 2" sizes.

You'll Be Better Satisfied with **BARBER** Gas Pressure REGULATORS

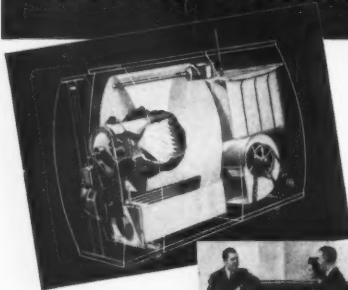
For dependability of operation, for positive response within narrow limits of pressure drop, you can rely on precision-made BARBER Pressure Regulators. Only tested principles of design and the finest of craftsmanship and materials go into them. All bronze body—brass working parts. Compact and attractive in appearance, for harmony with modern gas appliance styling. Sizes $\frac{1}{4}$ " to $1\frac{1}{2}$ " certified by A. G. A. Testing Laboratory. For today's top regulator value—**Better Buy Barber!**

- Write for complete literature, prices and discounts on the entire line of Conversion Burners, Appliance Burners, Controls and Regulators.

THE BARBER GAS BURNER CO.
3704 Superior Avenue • Cleveland, Ohio

The Barber Gas Burner Company of Michigan
4475 Cass Avenue, Detroit, Michigan

Builders Say: "GAR WOOD EQUIPMENT Aids in Selling Homes."



The Gar Wood Tempered-Aire gas and oil-fired home units are supreme in functional design and mechanical excellence.

There is a Gar Wood system for every type of home, large or small, costly or low-priced. Owners the nation over praise the performance, economy and operating efficiency of Gar Wood units. It's safest to equip any home with a Gar Wood. Dealers: write, wire, or telephone for franchise facts.

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Air Conditioning Division

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● GAR WOOD home heating and air conditioning furnace-burner units led the nation and topped all leading brands in percentage of total sales in 42 key markets in the United States, for the last three consecutive years.

WRITE TODAY
for Bulletin B473
describing home
air conditioning at
its best.



tain indoor air conditions that remain well within the realm of comfort. This is made possible by the fact that the heat absorption by the structure limits the rise in indoor temperature to a comparatively small amount. The results further emphasize the necessity, in cases in which the plant capacity is distinctly limited, of starting the cooling plant each day before the indoor temperature has risen above that required for comfort conditions. If the indoor temperature is allowed to rise above 80 deg. F., a comparatively high capacity will be required, even on a mild day, in order to effect a rapid decrease in the air temperatures, particularly at a time when the load on the cooling plant is increasing. Although the effects resulting from heat absorption by the structure apply to a larger extent to residence conditions, where the occupancy load is small, the effect of heat exchange between the air and the structure should also receive consideration in the case of other types of structures and under other operating conditions, particularly in installations in which a rapid reduction in the indoor air temperature is desired."

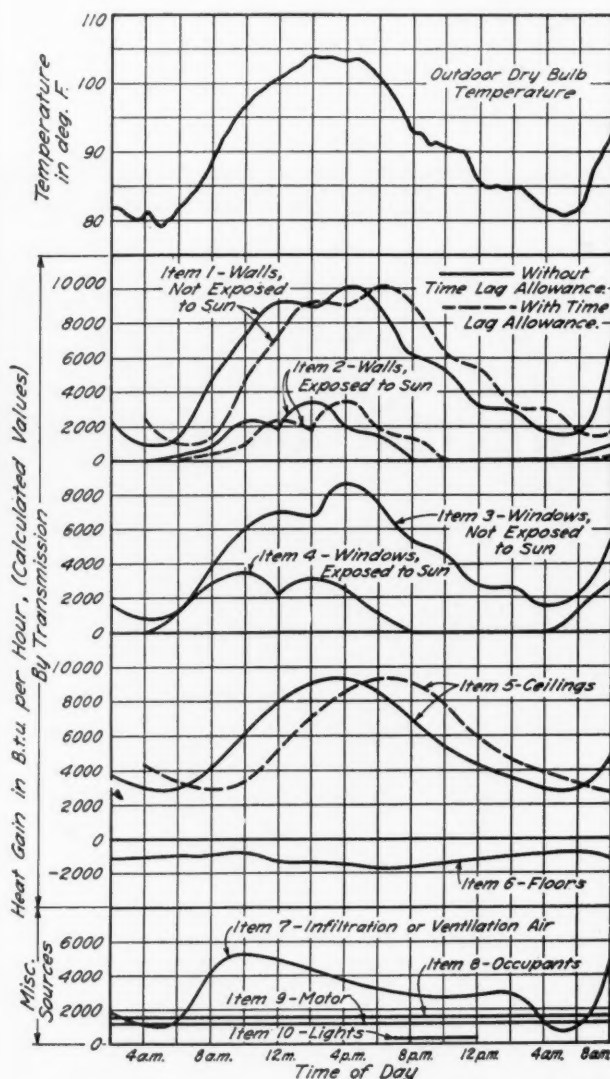
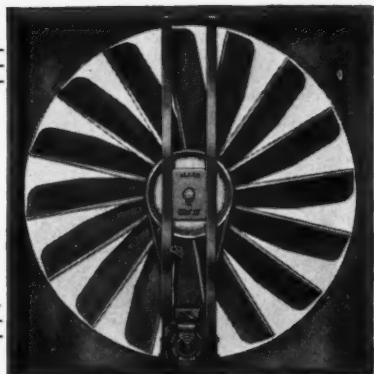


Fig. 5—Calculated components of the cooling load on Research Residence without and with allowance for time lag. (U. of I. Eng. Exp. Sta. Bulletin 305)



ALLEN ATTIC FAN (REAR VIEW)

Boosts Your Summer Volume!

This easily installed ALLEN ATTIC FAN cools homes quickly—sells in big volume all summer—boosts business for heating and sheet metal contractor. For a few cents per night, "cross-ventilation" is gained in every room, regardless of lack of "breeze" outside. Lifts the heat right out, and sucks the fresh air in.

NEW LOW PRICES. Write or wire today for new 12-page Manual and lowest prices in Allen history.

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BEAD CHAIN*

25 years of constant development has resulted in many practical and ingenious uses of BEAD CHAIN*, including effective assemblies for sheet metal products. We will cordially cooperate with manufacturers where chain is desirable for their products.



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AMERICAN ARTISAN, MAY, 1939

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FOR EASIER, BETTER RIVETING

Star Brand Rivets mean faster, smoother going on any riveting job—and assure best results.

Precision manufacture and rigid inspection insure accurate sizes and uniform quality.

Rivets are an important trifle. Use the best—Star Brand—the standard of quality for 76 years.

If your jobber or dealer can't supply you—write direct.



COPPER BRAZERS AND TINNERS' RIVETS
ROUND, FLAT AND COUNTERSUNK HEADS

★ ALSO SPECIALS FROM
BRASS, BRONZE, NICKEL-SILVER
EVERDUR, MONEL, NICKEL
AND OTHER NON-FERROUS METALS

OTHER PRODUCTS
SCREW MACHINE PRODUCTS
STOVE BOLTS—MACHINE SCREWS
MACHINE SCREW NUTS
Special headed & threaded parts
made from wire and rod

BLAKE & JOHNSON CO. Est. 1849
WATERVILLE · CONNECTICUT

Installed Furnaces Six Years— Now Employs Two Installers

"Gentlemen:

In answer to your letter of January 15, I am glad to tell you that I have followed your advice again.

You have been telling me for two years that I could increase my sales if I would give up installing and concentrate on sales.

Last year I found two mechanics who do real nice work. I can now spend all my time selling 'TRIPL-IFE' furnaces. We have many nice jobs installed and all my customers are so pleased.

I am sure I can sell enough in 1939 to keep my mechanics busy and make a nice profit.

Sincerely yours,

XYZ

..... Ohio."

Complete information; name, address of writer of above letter furnished on request. Phone, wire or write The Williamson Heater Company or nearest jobber. Representative will call within 24 hours.

FREE: Complete, easily understood short method for figuring air conditioning jobs. You can complete your figures, price job in one hour flat. Write Dept. 2.

THE WILLIAMSON HEATER COMPANY
Cincinnati, Ohio



Complete Line
Quick Service



You can triple your profits with "Tripl-ife"

Repair Parts

GUARANTEED TO FIT



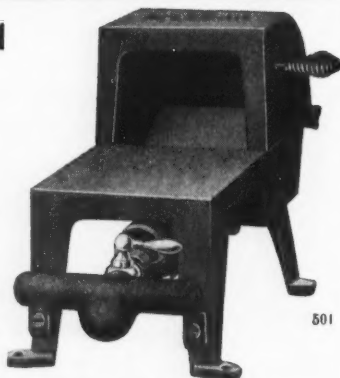
Ask About Our
TANK WATER HEATERS
A Summer Profit Maker

A. G. BRAUER SUPPLY CO.

316 North Third St. • St. Louis, Mo.

JOHNSON No. 501 Does Better Soldering and Heat-Treating!

Built for lifetime service and substantial fuel savings with all types of gas, the No. 501 does many jobs at low cost. Patented JOHNSON Direct Jet Burner delivers intense heat without blower. Equipped with shut-off valve and dependable pilot. Handles soldering coppers up to 6 lbs. per pair. Refractory base-lining aids in heat-treating tools and parts. Many features to promote faster better work. Write for low prices and complete JOHNSON catalog—today!



JOHNSON GAS APPLIANCE CO.
Cedar Rapids IOWA

Clean 'em hot—clean 'em cold Sell new plants by cleaning old. Clean that dirty chimney, too, And make more dough this season thru.

FURNACE cleaning is the one and only direct profitable route to the basement today. No basement, no business. All sellers of fuels, burners and heating equipment are using that route. If you don't get there first you won't get in at all—not even to your old customers. The one outstanding heating plant cleaner today is the Super Red Streak. Find out about it — learn how to sell cleaning jobs and make money at that—plus the many sales which follow. Try the Super Red Streak and sales plan free, at our risk. Use this coupon.



Only the Super Red Streak comes complete with special chimney cleaning tools which make that job easy. Homes want that, always.



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1944 N. 13th Street, Toledo, Ohio
Send me the Plan Book and complete information about your free trial and the new low-priced Super.

Name

Street Address

City and State

Gasco Guide

(Continued from page 41)

combustion chambers and the distribution system.

IV. Installation of Furnace

A. Furnace Room

1. Furnace should be installed in a room with sufficient air supply for ventilation and proper combustion. When such a room is not available, adequate fresh air openings to the outside should be provided. Properly screened metal sleeves having a net free area of 25 sq. in. per hundred thousand Btu furnace input with a minimum of at least seventy-five (75) square inches connected to unexcavated, ventilated spaces under the building furnish a satisfactory method. In the absence of an adequate air supply to the furnace room, outside air openings from two walls are desirable.

2. Furnace should be as near to chimney and as centralized with respect to heat distributing system as possible. Flue connections in excess of 20 feet in length are not desirable.

3. Suitable fireproofing must be used when furnaces are set up on combustible floors or installed adjacent to combustible materials.

B. Accessibility

1. Ample clearance should be provided around furnace to allow ready access for cleaning of all heating surfaces and for ready removal of filters, burner parts, fan motor, and controls. Fan and motor should be readily accessible for adjustment and lubrication.

2. Furnace should not obstruct ready access for servicing of other appliances, such as a water heater.

V. Controls

A. Thermostat

1. For greater convenience and economy, it is recommended that thermostats with automatic clock control be used.

2. The thermostat should be placed on an inside wall of a first floor room which is responsive to changes in outdoor temperature. The living room or the dining room is a generally acceptable location.

The following locations are known to give unsatisfactory results and are not recommended:—

Exposed walls

Walls of stair wells leading to unheated attic or unheated basement

Corner recess or alcove or other air pocket

Closets

Hallways exposed to stairway or door drafts

Kitchens

Bedrooms

Opposite or too near open fireplace

Porches

Too near kitchen door

Wall locations too near a radiator, register or in direct path of warm air stream, warm air riser or hot or cold water pipe.

B. Furnace Control

1. The system should be provided with a thermostatic fan switch or other device which will accurately control fan operation with respect to burner operation.

2. The thermostatic fan switch should be provided with a graduated scale and with means for ready and independent adjustment of the cut-in and cut-out temperature.

C. Summer Switch

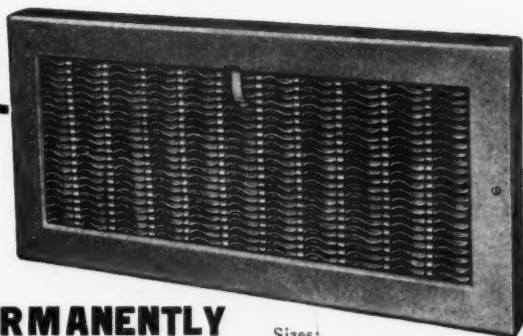
The fan should be installed with a labeled summer switch which can operate the fan independently of all other controls. This switch should be located at some convenient point, preferably at the first floor level or above.

D. Humidifiers

Humidifiers having evaporation rates sufficient to cause troublesome condensation should be limited by a humidity control.

Part 2, to follow, discusses duct construction and installation.

GALE "STREAK-PROOF" REGISTERS



PERMANENTLY LEAK-PROOF

Sizes:
4-6-8" heights
10-12-14" widths

Gale Registers give you everything you want—beauty in design, perfectly diffused air flow that evenly blankets the room (no drafts), and a one-piece construction with flexible packing that assures an absolutely streak-proof joint. Baseboard and sidewall types.

ASK YOUR JOBBER

for attractive prices—or write us direct for prices and catalog showing also the complete line of GALE "PRE-FABRICATED" DUCTS AND FITTINGS

CHAR-GALE MANUFACTURING CO.
3125 Hiawatha Ave. Minneapolis, Minn.

Now- GREATER PROFITS WITH FRIGID



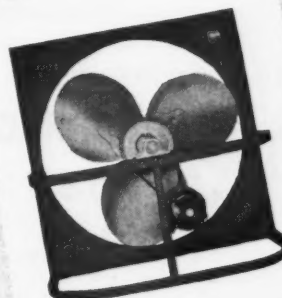
The FRIGID line of fans are sure-fire business getters because they offer your customers the highest quality fan at attractively low prices . . . and to you, they mean greater and more profits.

FRIGID GIANT ATTIC COOLER

Takes all the hot air out of the home and replaces it with clean, fresh air. With these outstanding features:

- QUIET IN OPERATION
- MOVES LARGE VOLUMES OF AIR
- LOW IN COST
- EASY TO INSTALL
- BALL BEARING MOTORS AND PIL-LOW BLOCKS
- FULLY APPROVED
- EXCLUSIVELY RUBBER MOUNTED
- BELT TENSION DEVICE
- CERTIFIED RATINGS
- SPECIAL FAN DUTY MOTORS
- HANDSOMELY FINISHED

Complete line of fans including floor, wall ceiling, counter and exhaust fans.



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No. 30 SHANK

The shank with twelve distinct adjustments. The shank that is designed to *Lick That Tough Job!*

Nos. 11 and 22 Shanks made especially for side rafter attachment, this combination will take care of any pitch. Equipped with the



NEW STARTING TEAT

which is a small wedge shaped prong, that, when tapped lightly will hold the shank securely in place—leaving both hands free for the use of nail and hammer.

We manufacture our complete line of hooks and hangers in black and tinned steel, as well as copper and Tuf-Bronze—A story in itself.

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BERGER BROS. COMPANY

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BRANCH
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SELL 'EM TOGETHER!



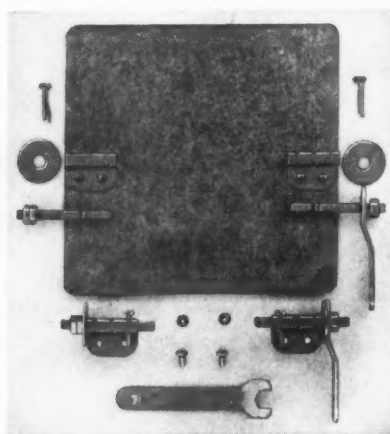
A RELIANCE TIME SWITCH with every Attic Fan!

There's plenty of money to be made in attic ventilation, and here's a way for the smart dealer to get extra money on each installation.

A Reliance Time Switch sold with every Attic Fan is the answer. This switch will turn the fan ON and OFF as desired resulting in decreased operating costs for the owner. Show them where a Reliance Switch will soon pay for itself in this manner and you'll have a good chance to sell one every time.

Sell Reliance Time Switches and Attic Fans together and make yourself handsome profits on every job. Write us today for further information.

RELIANCE AUTOMATIC LIGHTING CO.
1929 MEAD STREET RACINE, WISCONSIN



THE NEW K-B DAMPER CONTROL

Unique construction features separate rods and holders, allowing positive locking and close adjustment. No duct deforming.

Adjustable for any insulation or furring—always shows true position. ASK YOUR JOBBER—or write direct for particulars. Send 25c for working sample and direction sheet.

G. L. KERENTOFF
2803 Jefferson Ave.,
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You can get into many basements with **FIRE GUARD FURNACE FUSE**

Stops Overheating—Provides Safety

Here's a brand new Profit Item that's inexpensive and easily installed. Every furnace user has wanted the security FIREGUARD affords and will quickly buy; putting you right into the basement where you can sell new furnace parts, repairs and cleaning.

FIREGUARD is NEW and entirely different from anything you've seen—It retails for less than \$5.00 and yet it gives you TOP PROFITS.

Write for Descriptive Information.

The RAMEY MFG. CO., Dept. B-1, Columbus, Ohio

More New Customers, Cash Business for You— Every Day!

The hardest job for any salesman is to get into the home. With the GRAND RAPIDS FURNACE CLEANER your shopman is welcome. He not only gets into the home but gets paid for the cleaning job, and remember, furnace cleaning is CASH business.

The Doyle Sales Plan produces business for you, from the first day out. You get extra dollars every day and the best possible chance to sell needed repairs, new grates, thermostats, humidifiers, and complete new heating plants. Your being there first usually gets you this business without competition.

Write today for free 16-page book describing the complete and tested DOYLE BUSINESS BUILDING PLAN—No obligation.



DOYLE VACUUM CLEANER CO.
227 STEVENS ST., S. W. GRAND RAPIDS, MICH.



WISS SCROLL-PIVOTER SNIP

Cuts circles, scrolls and squares as easily as a straight line. Will cut alloy metals.

Now furnished with serrated blade unless otherwise ordered.

Use Wiss Hy-power and Bulldog Snips

J. WISS & SONS CO.
Established 1848 Newark, N. J.

Publicity Campaign

(Continued from page 33)

been widely broadcast because they do not mention manufacturers' or distributors' names and brands. They deal only with general information of benefit both to the industry and to the millions of families that use the industry's products.

To illustrate the nation-wide use of the publicity material made available, clippings received indicate that released material has now reached an average circulation of about ten million a month. Newspapers in 42 states and Canada are represented in the clipping returns. Requests for material have been received from such publications as—

	Circulation
American Builder and Building Age.....	70,291
Sunset Magazine	215,788
Household Magazine	1,909,764
Pathfinder	1,212,359
The Atlantic	115,552
Better Homes and Gardens.....	1,793,848
Science and Mechanics.....	169,846
N. Y. Herald Tribune Home Institute.....	350,128

Dealers who are interested in the opportunities that have been suggested for helping both themselves and the industry can obtain further information from any of the manufacturers who contribute to the publicity fund, or by writing to Information Bureau, National Warm Air Heating and Air Conditioning Association, 11 West 42nd Street, New York, N. Y.

Neubecker's Patterns For Stack Boots

(Continued from page 53)

Set the dividers equal to the spaces 7 to 6 to 5 in either section and step from 7 in the pattern to arcs 6 and 5 and draw a line from 5 to D.

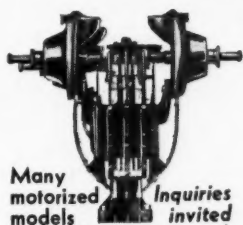
Now with D-C in plan as radius and D in pattern as center, strike a short arc near C and intersect it by an arc struck from 5 as center and 5-C in the true lengths as radius. Draw lines from 5 to C to D. With radii equal to B-2^v and B-3^v in the true lengths and B in the pattern as center, draw short arcs near 2 and 3. Set the divider equal to the divisions 1 to 2 to 3 in either section and starting from point 1 in the pattern step to arcs 2 and 3 and draw a line from 3 to B. Using B-C in plan as radius and B in pattern as center, draw a short arc near C and intersect it by an arc struck from 3 as center and 3^v-C in the true lengths as radius.

Draw lines from B to C to 3. With radii equal to C-4^v and 5^v in the true lengths and with C in the pattern as center draw short arcs near 4 and 5. Set the dividers equal to the divisions 3 to 4 to 5 in either section, and starting at 3 in the pattern step to arcs 4 and 5 and draw a line from 5 to C which of course equals 5-C at the opposite end of the pattern. Trace the curved line from 5 to 7 to 1 to 3 to 5. Then will C-D-A-B-C-5-1-5-C be the full net pattern. If pattern is desired in two halves the cut can be made where desired.

As the pattern is net, collars must be allowed and edges must be added for seaming and grooving.

ACCURACY

DEPENDABILITY



Many motorized models available in single stroke and multiple drive

Inquiries invited with samples of work you wish to do

when PRECISION counts —

There is one item in your specifications you can decide upon without hesitation—T R & S Rivets. T R & S quality means every rivet, no matter how many thousands you need, is usable; rivets of uniform preciseness, accurately gauged to drive with smoothness, to clinch with non-brittle efficiency. We have solved the riveting problems of America's leading industrial concerns.

TUBULAR RIVET & STUD CO.
World's Foremost Producers of Rivets
WOLLASTON MASSACHUSETTS

WISE BIRDS



SMART BUYERS Know

That the ideal time to make furnace repairs and new installations is during the spring and summer months. Then they're not caught short when cold weather comes again.



LACLEDE FURNACE CEMENT is preferred by those in the know because it Dries Faster, Sets Stronger, Lasts Longer. Won't disintegrate during long periods of non-use. And when subjected to high heat it's there with strength to spare.

LACLEDE-CHRISTY St. Louis

New! **LACLEDE FIREZIST PLASTIC LINING** hand moldable plastic refractory for furnaces, oil burners, stokers, etc. Write for literature.

WHITNEY LEVER PUNCHES

No. 4B PUNCH



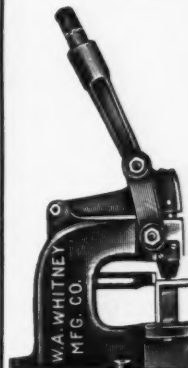
Length—8½ inches. Capacity ¼-inch through 16 gauge. Deep Throat—2 inches. Weight—8 pounds. Punches and Dies—¾" to ¾" by 64ths.

No. 6 PUNCH



Length—26½ inches. Capacity — ¼-inch hole through ¾-inch iron; especially adapted for button punching or template work. Punches and dies ¾" to ¾" by 32nds.

No. 91 PUNCH



Capacity — ¼-inch hole through ¼-inch, 1-inch hole through ¾-inch and 2-inch hole through ¾-inch iron. Depth throat 5 inches. Weight—82 lbs.

We have tools for every purpose needed by Sheet Metal Contractors.

Ask your Jobber

No. 1 PUNCH



Length — 34 inches. Capacity — ¼-inch hole through ¾-inch iron. Punches and dies in sizes from ¼ to ¾ by 64ths.

No. 2 PUNCH



Length — 23 inches. Capacity — ¼-inch hole through ¾-inch iron. Punches and dies in sizes ¾-inch to ¾-inch by 64ths.

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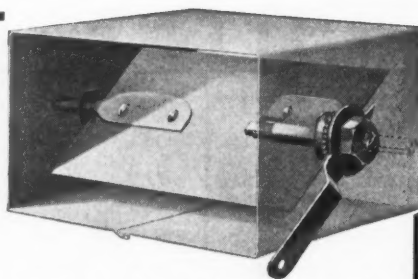
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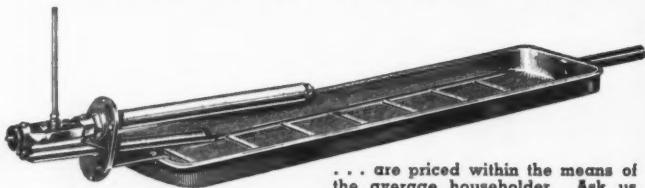
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CEDAR FALLS, IOWA

**Shower Stalls,
Toilet Partitions**

(Continued from page 74)

els. The customary overall height is 82 inches.

The sheet metal equipment in the Long Island City plant of this fabricator includes the large shear (12 ft. long), two power brakes (one handles ¼ in. thickness of steel sheet), a hand brake, three punch presses, several power saws, three presses, both stationary and portable spot and oxy-acetylene welding units, two large spray booths with ventilation, an overhead conveyor from booths to bake oven. The oven is of unusually large capacity, being 30 ft. long.

Shear and largest brakes are located near rear plant doors so that initial operations occur first. Sheets for the most part are delivered cut to specified sizes and are bought in full carloads. Following all shearing that may be necessary in the Fiat plant, work progresses towards spray booths and drying oven, in a separate room remote from the delivery door, although as baked, finished work leaves the oven for the shipping department the latter is handy to a truck loading platform.

Finished products leave the fabricator's plant flat, as a rule, ready for erection and installation by contractors on location. Several large trucks are kept active daily.

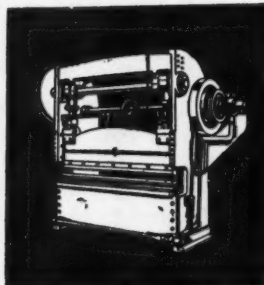
**Attic Ventilation
in Arkansas**

(Continued from page 56)

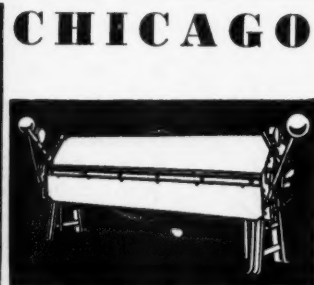
the state think about trying to keep cool." Attic ventilation, he says, "is a simple and practical solution of our summer heat problem."

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Including in the power company's new dealer-utility program is a reporting system, in which dealers make monthly reports on appliance sales. These are used by the Sales Promotion Division to keep the customer survey up to date. Monthly publication of total sales of all appliances during the previous month gives the dealers an idea of just how effective campaigns are, and enable them to estimate what other dealers are doing.



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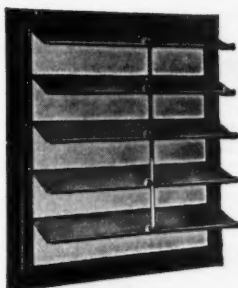
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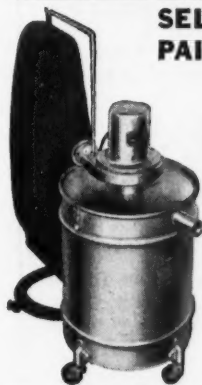
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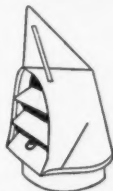
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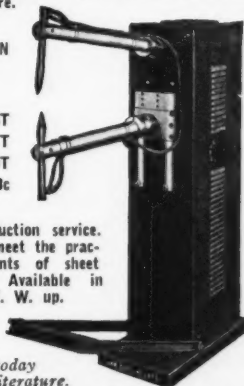
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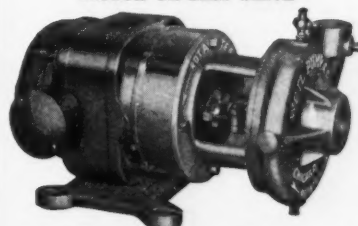
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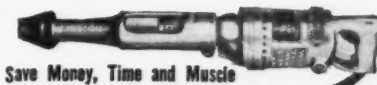
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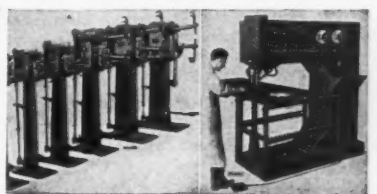
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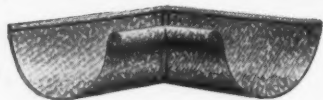
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better-looking corners**

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